ORDERING AND HANDLING MATERIALS FOR MAJOR PUBLIC WORKS DEPARTMENT JOBS

Joseph David Kunz

NAVAL POSTGRADUATE SCHOOL
Monterey, California

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ORDERING AND HANDLING MATERIALS FOR MAJOR PUBLIC WORKS DEPARTMENT JOBS

by

Joseph David Kunz

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Thesis Advisor: J. W. Creighton
Thesis Co-Advisor A. W. McMasters

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This thesis examines the procedures for obtaining materials for major jobs on real property facilities by the Public Works Department at a Naval Shore Activity. A detailed description is provided of the current procedures at the Naval Postgraduate School, Monterey, California, for identifying, ordering, monitoring, receiving, storing and retrieving the needed items. Discussion is focused on those methods which are considered inefficient and

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by

Joseph David Kunz
Commander, Civil Engineer Corps
United States Navy
B. ARCH., University of Texas, 1960

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NAVAL POSTGRADUATE SCHOOL
December 1977

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ABSTRACT

This thesis examines the procedures for obtaining materials for major jobs on real property facilities by the Public Works Department at a Naval Shore Activity. A detailed description is provided of the current procedures at the Naval Postgraduate School, Monterey, California, for identifying, ordering, monitoring, receiving, storing and retrieving the needed items. Discussion is focused on those methods which are considered inefficient and on alternative methods to supplant them. The thesis concludes that the efficiency of the current procedures can be significantly improved and makes specific recommendations to effect the improvements. A summary of all recommendations is provided in the concluding chapter.

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TABLE OF ABBREVIATIONS

AAA	Authorized Accounting Activity
APWO	Assistant Public Works Officer
AUTODIN	Automatic Digital Network
BPA	Blanket Purchase Agreement
COD	Cash on Delivery
DIR	Daily Issue Record (Shop Stores)
EDIT	Technical Editing Section, Issue Control Branch, Control Division, Supply Department
FNWC	Fleet Numerical Weather Central
FSN	Federal Stock Number
FY	Fiscal Year
GF	General Foreman, Maintenance Division, Public Works Department
JF	Job Folder
JON	Job Order Number (Accounting)
ML	Material List
NPS	Naval Postgraduate School
NSCO	Naval Supply Center Oakland
OPTAR	Financial Operating Target
P/E	Planner and Estimator, Maintenance Control Division, Public Works Department
PWA	Administrative Division, Public Works Department
PWAD	Director, Administrative Division, Public Works Department
PWC	Maintenance Control Division, Public Works Department
PWCD	Director, Maintenance Control Division, Public Works Department

PWD	Public Works Department
PWM	Maintenance Division, Public Works Department
PWMD	Director, Maintenance Division, Public Works Department
PWO	Public Works Officer
SCN	Shop Control Number
SP	Shop Planner, Maintenance Division, Public Works Department
SPCC	Ships Parts Control Center, Mechanicsburg, Pennsylvania
SRO	Shop Repair Order (Transportation)
SSS	Sub Shop Stores
STUB	Requisition for purchase of goods or services
SWA	Service Work Authorization (Emergency or Service Work)
WA	Work Authorization
WC	Work Center

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I. PURPOSE AND METHOD

The purpose of this thesis is to analyze the procedures for ordering and handling materials for major jobs on real property facilities accomplished by Public Works Departments at Naval Shore Activities. The method selected for performing the analysis was an in-depth examination of the procedures at a typical Naval Shore Activity which contained a Public Works Department, and the Naval Postgraduate School (NPS), Monterey, California, was chosen. The procedures described, problems discussed and recommendations made apply specifically to NPS but are generally applicable to other Naval Shore Activities.

II. INTRODUCTION

The accomplishment by the NPS Public Works Department (PWD) of any job, large or small, requires the issuance of an authorization document signed by the Public Works Officer (PWO) or one of his designated representatives. If the job involves real property (as opposed to Transportation or Construction Equipment) and it is a major job (a job which requires more than 16 man hours of labor or costs more than $100 in material to accomplish), it requires the issuance of a Work Authorization which will be referred to hereinafter as a WA. If the job is a one time job, such as the replacement of a roof, the painting of a building, or the repair of a road, it is called a Specific Job. If it is a repetitive maintenance effort, such as grass cutting, it is called a Standing Job. This thesis will be limited to materials for jobs authorized under Specific WAs.

The execution of any Specific (with very rare exceptions) WA, requires the consumption of materials. Efficient execution of the WA requires that the proper materials in the right quantities be on site prior to the time the craftsmen need them. The logistic effort of obtaining these materials involves a significant number of tasks which must be performed before the direct construction labor on site can be scheduled or accomplished. In addition, since the flow of WA accomplishment through the Department is continuous, with numerous jobs underway at any one time; it is necessary for these logistic

efforts to be performed in a systematized manner to ensure that each necessary task is accomplished, to allow efficiency in accomplishment of each task and to avoid the need for individual management attention to each task.

The principal tasks involved in this logistic effort as it is presently performed at NPS are: the preparation of the material list, the authorization of the work, the establishment of accounting control, the review of the job in the PWD Maintenance Division, the ordering of the material, the receipt and transfer of the material by the Supply Department to the PWD, the segregation and storage of the material until it is needed, and the issue of the material for job execution.

Each of these tasks can consist of numerous component steps by a significant number of individuals in a wide variety of positions and geographical locations within NPS. There are also tasks which must be accomplished by other supporting commands and agencies as well as commercial vendors. However, this thesis will consider and discuss in detail only those tasks and functions which occur within the NPS organization.

In chapter III each task and its component subtasks and steps will be described as they are currently performed. The order of discussion will be chronological unless otherwise stated.

In chapter IV certain of the current procedures will be discussed and improvements will be recommended which, in the opinion of the writer, will improve the efficiency and/or effectiveness of the process.

In all instances where current procedures are mentioned, this refers to the procedures which were current when the research was performed. Since the research has been performed, however, several of the procedures have been changed, generally in accordance with the recommendations made herein. Therefore, to avoid confusion, current procedures will be referred to in past tense.

III. CURRENT PROCEDURES

Before improvements can be recommended or evaluated, the current procedures must be thoroughly understood. A flowchart showing each task/subtask in the sequence in which it was performed is provided as Fig. 1. A brief description of the steps accomplished within each subtask is included in the notes to Fig. 1. A more detailed description of each step is included in this Chapter. The information for this Chapter and Fig. 1 were gathered from numerous interviews with the individuals who performed the various tasks or their supervisors.

A. PREPARATION OF THE MATERIAL LIST

The requirements for maintenance, repair or minor construction work, which will eventually lead to the execution of a WA, emerged from one of the several sources described in Ref. 1. These will not be explained in detail here; but briefly, the sources included deficiencies reported as a result of the continuous inspection program, Work Requests from authorized individuals describing either an observed deficiency or a desired alteration to a real property facility, or Service/Emergency calls describing an observed deficiency. The first step in the execution of one of these requirements was the assignment of the job by the Maintenance Control Division Director (PWCD) to one of the four Planner/Estimators (P/Es) in the Maintenance Control Division (PWC) for the

preparation of the WA. (See task 1 on Fig. 1.) The P/E accomplished the planning, design and minor engineering necessary to prepare a detailed written description (often with sketches) of the work to be done and an estimate of the cost and man-hours required. A complete list of the materials needed was also prepared including sufficient specifications to allow the purchase of any special or unusual items.

The WA consisted of a cover sheet form (entitled Work Authorization/Estimate (Maintenance Management), NAVFAC form 11014/22 (10-74)) and usually one or more continuation sheets, all of which were prepared in longhand. The cover sheet contained a brief description of the job and a summary breakdown of the estimate of time and dollars to accomplish it. It also contained blank spaces for the insertion of the pertinent accounting data for the job. The detailed description, specifications and estimates were usually shown on the continuation sheets.

The form used to list the materials required was the Materials Requirements/Issue Document (Non Mechanical) NAVFAC form 9-11014/8(4-67). These forms will be referred to later in this thesis as Material Lists and abbreviated (ML). For the normal job, separate ML sheets were prepared for each work center (WC) in the PWD which would participate in the job; and within each WC a separate ML sheet was prepared for each general stream source from which materials were to be obtained, i.e., from the NPS Supply Department Shop Stores; from the Naval Supply Center, Oakland (NSCO), which provided all Federal Stock Numbered (FSN) items not carried locally;

and from vendors who would contract with the NPS Supply Department Purchasing Branch. The P/E referred to copies of the NPS Shop Stores catalogue and the GSA catalogue to determine the proper stream source for each item needed. An original only of each ML sheet was prepared and attached to the WA as an enclosure. The brief description from the WA cover sheet was repeated on each ML sheet.

Ref. 2 indicated that the accomplishment of this task required from a few hours to several weeks, depending on the scope, complexity and relative priority of the job.

B. AUTHORIZATION OF THE WORK

1. Release of the Work Authorization

The PWCD is the key individual in the management of the PW real property maintenance effort. At the typical Naval Activity, he assigns jobs to the P/Es for the preparation of WAs; he ensures that the design and estimates for the WAs are sound and that the cost of the job does not exceed the Commanding Officer's approval authority; he ensures that the work is essential to accomplish within the funds available; he decides upon the proper timing for release of the WA after considering seasonal requirements, priority of the work, etc.; he releases the WA; and after all materials for the WA are on hand, he selects the month in which the job will be programmed for accomplishment. After the WA is released by PWCD there should be no intentional delays in the procurement of materials for it.

At NPS the completed WA package was handed to PWCD for review, correction if necessary and approval. (See subtask 2 on Fig. 1.) He performed the typical functions as described above with one significant exception: he did not consider the funds available before release of the job. This function was performed in the Administrative Division of PWD (PWA), and this point will be addressed in subparagraph IV B.2.b.(2) below.

The NPS Commanding Officer's approval authority for release of WAs, which had been fully delegated to the PWO, was limited to $25,000 for repair work and $15,000 for alteration work. His approval authority for maintenance work was limited only by the funds available. The approval authority delegated to PWCD was limited to $1,000 or less for all types of work. If the total WA amount was beyond the approval authority of PWCD he obtained the approval of the Assistant Public Works Officer (APWO) or PWO.

2. Shop Control Number Assignment

The approved WA was handed to the PWC clerk where an identification number, called a Shop Control Number (SCN), was assigned which was unique to that particular job. (See subtask 3 on Fig. 1.) This SCN became a part of the full accounting Job Order Number (JON) used by the NPS Comptroller and NSCO, the Authorization Accounting Activity (AAA) for the NPS, to track all commitments, obligations and expenditures against the job. The PWC clerk then hand-carried the WA to PWA.

C. ESTABLISHMENT OF ACCOUNTING CONTROL

1. Establishment of the Job Order Number

The approved WA package was delivered to the PWA Fiscal Branch where 2 of the 5 clerks employed were assigned the responsibility for processing WAs, MLs and requisitions, among their other duties. (See subtask 4 on Fig. 1.) The appropriate clerk for the fund source involved selected the proper accounting data for the job and checked the balance of funds in the Financial Operating Target (OPTAR) to ensure it was sufficient to allow accomplishment of the job. This involved a check of material funds only, as the management of all labor funds was retained by the NPS Comptroller. The clerk then prepared an input document, form 12ND Gen 7510 005 (Rev 5-70), for forwarding the JON assigned to the job to NSCO for entry into their computer. This JON was assigned in accordance with Ref. 3. (NAVCOMPT Manual) and was recorded on the WA. A copy of the input sheet was retained by PWA for memorandum accounting purposes.

2. Checking of the Accounting Data

The WA was handed to the Supervisor of the Fiscal Branch of the PWA who checked the accounting data assigned and also rechecked for compliance with the various approval authority limitations. (See subtask 5 on Fig. 1.) Approved WAs were initialed by the Supervisor and hand-carried back to the PWC clerk.

3. Reproduction and Distribution

Copies of the WA with accounting data entered were then reproduced by the PWC clerk, and the information from

the WA was entered in the PWC monitoring aids. (See subtask 6 on Fig. 1.) Copies were made for the staff of the Public Works Maintenance Division (PWM), for each PWM Work Center involved and for the files of PWC and PWA. The PWC monitoring aids included a Shop Manhour Backlog, a P.E Effort Summary, a WA Backlog, etc. The WA package with MLs and PWM copies was then forwarded to PWM, and the other copies were distributed. Mail delivery between the PWD management offices (PWO, APWO, PWA, PWC, etc.) and PWM was accomplished by the PWM driver who made four rounds daily: early morning, before noon, after noon and before close of business.

D. REVIEW IN THE MAINTENANCE DIVISION

1. Preparation of Job Folder

The PWM Master Scheduler date-stamped one copy of the summary sheet of the WA (hereafter referred to as the original of the WA) and prepared the job folder (JF) which was to be retained by PWM for monitoring purposes throughout the life of the job. The original of the WA was retained in the JF. He also prepared a job-strip, a cardboard strip which contained the pertinent information for scheduling the job (descriptive title, number of man-hours per WC involved, etc.), and placed it on the schedule board in the area which showed all jobs awaiting materials. (See subtask 7 on Fig. 1.) The WA was then handed to the Director of PWM (PWMD).

2. Review by Division Director

The WA was reviewed by PWMD and it was assigned to one of the two General Foreman (GFs) in PWM for job accomplishment. (See subtask 8 on Fig. 1.) The WA was then

handed to the GF for his review. There were also two Shop Planners (SPs) in PWM, each of which supported one of the GFs by initiating and monitoring the material acquisition process for the GF's jobs. The assignment of the job to one of the GFs, in effect then, also assigned the job to one of the two SPs.

3. Review by General Foreman

The several WCs in PWM were divided into two groups, each of which was assigned to a GF. The WCs for carpentry, painting, plumbing, electrical work, housing maintenance, and locksmith work were assigned to one GF while the WCs for machinists work, emergency/service work, gardening, roads and grounds maintenance and boiler work were assigned to the other. Upon assignment of a WA to a GF, he reviewed the WA in detail, including a visit to the job site if he considered it necessary. (See subtask 9 on Fig. 1.) The time consumed in this review could vary from a few hours to a few days.

If any significant problem areas were noted, they were resolved with PWC before the job progressed further. If minor oversights or omissions on the ML were noted, the SP was notified and the additional items were added to the appropriate sheets of the ML. In this event, the total cost of the added items was compared to the amount reserved for contingencies on the WA. If the amount was exceeded, it was required that an amendment be requested and received by PWM before the work could proceed. Ref. 4 indicated that this occurs very infrequently. If no errors were found or remained, the WA was handed to the SP for material procurement.

E. ORDERING MATERIALS

1. General

The SP took the initial steps in the ordering process. (See subtask 10 on Fig. 1.) First he entered the accounting data from the WA on each sheet of the ML. He then screened all ML sheets listing non FSN items to determine if they were candidates for purchase by Blanket Purchase Agreement (BPA), a process which is described below. If the total value of all the non FSN items for one WC (one type of work, i.e., plumbing, electrical, etc.) was less than $500 (the limit of the SP's BPA procurement authority) and all the itmes could be immediately supplied by one of the BPA vendors from off-the-shelf stock, it was a suitable candidate for BPA procurement. The SP then removed from the ML package those sheets which listed the items what would be purchased under BPAs and held them in the JF for later purchase when all other materials had been received and the job was scheduled for accomplishment. This eliminated the need to store the BPA purchases for long periods while awaiting arrival of other purchases. The MLs for all remaining (non BPA) purchases were duplicated and copies were retained in the job folder. The originals of these remaining MLs were forwarded to the Supply Department Shop Stores, but a copy of the WA was not forwarded. MLs were hand-carried to Shop Stores by their own personnel who normally made several trips daily to the SP's office and who carried the MLs when they returned.

2. Blanket Purchase Agreements

The BPA purchases were chronologically one of the last steps performed in the material ordering process as described above. However, for convenience this process is described first.

a. Background

A BPA is a method for facilitating small purchases by DOD activities. It is a negotiated agreement with a vendor, usually in the vicinity of the activity, which establishes in effect a "charge account" to cover small purchases of items of the same general category, i.e., plumbing supplies, lumber, etc. It eliminates the necessity of issuing individual purchase orders for these small requirements. Procedures for negotiation and use of BPAs are included in Ref. 5.

b. Placement of Orders

(1) The SPs, who were authorized government representatives for the purpose of BPA procurement from certain vendors, called the appropriate vendor by telephone to verify that the desired item(s) was available off the shelf. (See subtask 28 on Fig. 1.)

(2) The order was placed and the SCN, item description, quantity, unit cost and total cost for each item was recorded by the SP, together with a call number which was unique to that particular call, on a Blanket Purchase Authority Information form (12ND NPS 4270/3(4-70). This form will hereafter be referred to as a BPA form. The vendor was notified

of the call number, and he recorded it on his delivery papers and prepared the item for pickup. (See subtask 29 on Fig. 1.)

(3) A copy of the BPA form was carried to the vendor by the government driver who obtained the merchandise and a copy of the vendor's delivery papers.

(4) The merchandise, vendor's delivery papers and the copy of the BPA form were then delivered to the NPS Supply Department Receiving Officer who retained one copy of the vendor's delivery papers and a copy of the BPA form after stamping them with a certification that the material had been received. (See subtask 30 on Fig. 1.) The merchandise was then carried by the driver to the SP. The certified BPA form and vendor's receiving papers were forwarded by the Receiving Officer to the Supply Department Receipt Control Branch for payment of the vendor.

(5) Upon receipt of the item(s), the SP forwarded the original of the BPA form to PWA for preparation of the requisition. (See subtask 31 on Fig. 1.) The procedures for receipt and storage of the items are described in paragraph III G. below.

3. Shop Stores Procurement

a. General

A branch of the NSCO Shop Stores was located within the NPS Supply Department. It was commonly referred to locally as Sub Shop Stores, and it will be abbreviated in this thesis as SSS. It was a small stock point whose inventory was funded by the Navy Stock Fund and which held those common items of material which were frequently requested by local

users. Items which were requested at a certain frequency per time period (currently 3 requests in 6 months) were acquired and held in inventory for issue as needed. When demand for an item held in inventory dropped below a certain frequency per time period (currently no requests in one year), the item was deleted from the inventory carried.

b. Shop Stores Procedures

Material Lists were first checked against the SSS inventory records and a list was made on a Sub Shop Stores Daily Issue Record, 12ND NPS 4402/1 (5-77), hereafter abbreviated DIR, which showed all the pertinent information for each item, i.e., FSN, unit of issue, unit price, description of the item, and the SCN of the job for which it was issued. The locations in the warehouse for those items were noted, the inventory records were updated to delete them from inventory and the ML was marked up to show that they had been filled. If items were included on the ML which were normally carried in SSS, but which were temporarily not in stock, these items were ordered from NSCO on a backorder and were marked off the ML just as if they had been filled. The items on hand were then gathered from their warehouse locations. An SSS employee determined by phone call whether the SP desired to receive the material or whether it was to be delivered to the appropriate WC, and then delivery was made as desired. (See subtask 11 on Fig. 1.) The ML was then marked up to show which items were filled and a copy was made and retained by SSS. If all items on the ML were filled by SSS, the marked up original of the ML, and one copy for each WC involved, was

returned to the SP. If there were items on the ML not normally carried by SSS (either non local FSN or non FSN items, which will be referred to as long lead items), two copies of the ML were returned to the SP, and the original was forwarded to the Issue Control Branch of the Supply Department. This branch performs the technical editing and will be referred to in this thesis as EDIT. All MLs completed by SSS during each day were held and at the end of the work day were hand-carried to EDIT. The DIRs were forwarded periodically (usually weekly according to Ref. 6) to PWA for preparation of requisitions.

4. Technical Editing Material Lists

Technical editing was performed by a single individual in EDIT. He reviewed long lead items as described below. (See subtask 12 on Fig. 1.)

a. Federal Stock Numbered Items

All FSN items listed in the ML package were checked against a microfiche copy of the complete Standard Stock Catalogue to ensure that the nomenclature, unit of issue, and price were correctly shown. Errors found, if any, were corrected by EDIT on the original of the ML. When approved, it was initialed by the individual checking it and forwarded via guard mail to the Fiscal Branch of PWA for the preparation of requisitions. There were two rounds made per day by the guard mail couriers at approximately 1000 and 1400. Mail picked up on one round was delivered to the next addressee on the following round.

b. Non Federal Stock Numbered Items

All non FSN items in the ML package were checked against the complete Standard Stock Catalogue to determine if an FSN item could be substituted. If it could, all pertinent information about the item, i.e., FSN, unit price, etc., were noted on the ML by EDIT. If it could not, the ML was initialed by the editor. Material Lists which had been checked were forwarded via guard mail to the Fiscal Branch of PWA for the preparation of requisitions.

5. Initiating the Requisition

The two clerks in the PWA Fiscal Branch who prepared requisitons received input which triggered their preparation from numerous sources in various forms. The only three such inputs which will be covered in this thesis are the BPA forms (see subparagraph III E. 2. b. above), the DIRs showing the WA items issued or backordered by SSS (see subparagraph III E. 3. b. above), and the MLs showing WA long lead items which have been returned from EDIT. A requisition is prepared on a DOD Single Line Item Requisition System Document (Manual), DD Form 1348 (6-pt) 1 Mar 74. It will be referred to in this thesis as a STUB. It may have additional specification data attached. The procedures discussed in this section cover subtasks 13, 14 and 15 on Fig. 1 for the several types of STUBS prepared.

a. STUBS for Long Lead Items

(1) Entering the Accounting Data. The MLs received from EDIT were distributed to the clerk responsible for the type of STUBS required. (See subtask 13 on Fig. 1.)

The clerk then date-stamped the ML to show the time of its receipt, checked the JON shown on the ML to ensure it was appropriate for the work described on the ML, and entered the accounting data which corresponded to that JON (i.e., functional category, cost account, segment number, etc.) on each sheet of the ML. The clerk then assigned and entered the next sequential requisition number (STUB number) to either the entire sheet for non FSN items, or to each line item for FSN items, and handed the marked up ML to the Supervisor of the Fiscal Branch.

(2) Checking the Accounting Data. The Supervisor of the Fiscal Branch checked the entries made by the clerk on the MLs for accuracy. The description shown at the bottom of each ML was also checked to ensure it was thorough. (See subtask 14 on Fig. 1.) The ML was then returned to the clerk.

(3) Preparing the STUB. The clerk typed all the STUBS required for the ML package and hand-carried the STUBS and MLs to PWAD.

(4) Releasing the STUB. The STUBS were checked by the PWAD to see that the items being procured were appropriate for the job, based on the description written at the bottom of the ML. If questions arose during the PWAD review, he obtained answers from PWC or PWM before the STUBS were released. When no questions arose or remained, the STUBS were signed by PWAD and returned to the PWA clerk. (See subtask 15 on Fig. 1.)

(5) Reproduction and Distribution. The PWA clerk made copies of the marked up MLs and sent the originals to PWM. A copy was placed in the PWA files with a copy of the STUB. A copy was sent to PWC, and a copy was sent to the NPS Comptroller attached to the original and remaining copies of the STUB. These were all forwarded in the guard mail except that urgent STUBs were hand-carried to the NPS Comptroller twice each day.

b. STUBs for Shop Stores Items

(1) General. The preparation of STUBs for SSS items occurred after they had already been delivered to PWD or backordered. Therefore STUB preparation for them did not contribute to the material lead time. It is described here for information only, and SSS STUB processing is not depicted on Fig. 1. It should be understood, however, that the SSS STUB preparation workload was handled by, and consumed the time of, the same clerk who prepared long lead STUBs.

(2) Preparing the STUB. The PWA clerk responsible for the STUBs date-stamped the DIR to show the time of its receipt. The line item entries on the DIR were then consolidated by cognizance code within each JON. One STUB was prepared for the total amount spent in each cognizance code against each JON. (See subtask 13 on Fig. 1.) The DIR was then marked up to show the STUB number under which each line item was purchased. The STUB and the marked up original of the DIR were handed to the Supervisor of the Fiscal Branch.

(3) Checking the Accounting Data. The Supervisor of the Fiscal Branch checked the accounting data assigned to ensure accuracy. (See subtask 14 on Fig. 1.) The STUB was then handed to PWAD.

(4) Releasing the STUB. The STUB was rechecked by PWAD, and if approved, it was either signed by PWA or he obtained the signature of the APWO or PWO if it was beyond his approval authority. One copy of the approved and signed STUB was retained by PWA. (See subtask 15 on Fig. 1.) The original and remaining copies were forwarded to SSS together with the original of the marked up DIR. A copy was made and forwarded to PWM for the job folder.

(5) Processing the STUB. The amounts on the STUBs were checked by SSS to ensure that the money value of all items issued were covered by the appropriate STUB. One copy of each STUB was then forwarded to the NPS Comptroller for manually recording the commitment and obligation in the memorandum accounts, and one copy was retained by SSS. The original and remaining copies were mailed by SSS directly to NSCO for entry of the data into the computer for accounting and inventory update.

c. STUBs for BPA Items

By the time BPA STUBs were prepared, the items already had been received by PWM. Again, STUB preparation for them did not contribute to material lead time, but the BPA STUB preparation workload was handled by, and consumed the time of the same clerk who prepared long lead STUBs. The procedures for STUBs for BPA items were similar to those for

long lead items except the clerk received a BPA form instead of a ML from PWM and entered the accounting data on it. One STUB was prepared for each BPA form.

6. Entry of Accounting Information

The STUBs were delivered to a clerk in the Budget Division of the Comptroller Department where the green copy of the STUB was removed and held temporarily. (See subtask 16 on Fig. 1.) On a frequent periodic basis (daily was the goal but it was frequently not attainable according to Ref. 7), the STUBs were consolidated by OPTAR or Customer Account and the totals were posted to the balances shown in the memorandum account records kept by the Budget Division. When posting was complete, the data on each STUB was entered on a Fund Resources (Input) 12ND 7303/2 (Rev. 7-73), which together with the green copies of the STUBs were mailed to NSCO for entry into the official accounting records via their computer. The memorandum accounts were used to reconcile the periodic Ledger Reports (Report Number UC 68g) and monthly Document Control Reports (Report UA 92) which were received from NSCO. The originals of the STUBs, and any attached MLs or other continuation sheets, were hand-carried to EDIT in the Supply Department. Urgent STUBs were processed immediately and hand-carried to EDIT before the routine STUBs were processed.

7. Supply System Ordering

a. Technical Editing STUBs

When the STUBs for long lead items arrived in EDIT, they were examined to ensure that they had been previously checked and initialed as stated in subparagraph

III E. 4. a. above. (See subtask 17 on Fig. 1.) If they had not been initialed, these previously described checks were made and errors were corrected. The originator and the Comptroller's Budget Division were notified of any price changes. When no errors or questions remained unresolved, they were separated into two streams, FSN and non FSN items; and each STUB was date-time stamped. FSN items were held by EDIT for review and further processing, and non FSN items were hand-carried to the Director of the Control Division of the Supply Department for further processing. These two streams diverged at this point and did not merge again until the materials were delivered to NPS. Each stream will be discussed in detail. On Fig. 1 the processing of FSN STUBs is shown in subtasks 17, and 20 through 25; while the processing of non FSN stubs is shown in subtasks 18, 19 and 25.

b. Federal Stock Numbered Items

(1) Distributing Copies. Two copies of each FSN STUB were pulled. One was forwarded to the Receipt Control Branch for their suspense file, and the other was forwarded to the Supply Department Receiving Officer for eventual comparison with the receiving papers. The original was then handed to the Issue Control Branch keypunch operator

(2) Keypunching. The keypunch operator made a computer input card for each STUB. (See subtask 20 on Fig. 1.) The input cards were then hand-carried to the NPS Quarterdeck.

(3) Delivery to FNWC. STUBs were carried from the NPS Quarterdeck to Fleet Numerical Weather Central (FNWC) three times each day at approximately 0700, 1300 and 1500. (See subtask 21 on Fig. 1.)

(4) AUTODIN Transmission. The STUBs were entered into the FNWC computer for AUTODIN transmission to NSCO. (See subtask 22 on Fig. 1.)

(5) Non Local Processing and Manufacturing. NSCO Oakland took appropriate action to fill the requisiton and have the item delivered to NPS. This was done in one of several ways including filling from inventories held at NSCO, filling from inventories held at one of the other Navy or Federal Government Stock Points, or by placing a purchase order with a vendor. These actions will not be discussed in detail in this paper, but they are shown on Fig. 1 in subtasks 23, 24 and 25.

c. Non Federal Stock Numbered Items

(1) Checking the STUB. The Director of the Supply Department Control Division checked each STUB to familiarize himself with the items being ordered, and to ensure the nomenclature was complete. (See subtask 18 on Fig. 1.) Any errors were left for resolution by the Purchasing Branch. The STUBs were then hand-carried to the Supervisor of the Purchasing Branch.

(2) Making the Purchase. The types of documents and methods for awarding a contract for the purchase of goods or services are numerous, and the pertinent regulations are varied and complex. A description of each is not material

to this thesis. In general however, the steps for any type of procurement action at NPS were similar. A responsible vendor was located who could produce an acceptable item in a manner which was responsive to the initiators needs, and an award was made to the vendor. (See subtask 19 on Fig. 1.) The Supply Department Receiving Officer and the Receipt Control Branch of the Control Division were forwarded copies of both the STUB and the purchase document. The initiator was also provided a copy of the purchase document except for items ordered under a BPA (less than $500 from a vendor holding a BPA) or items ordered COD (less than $150 including shipping charges). The majority of the purchases for the Public Works Department are made by BPA or COD, so copies of the purchase documents are not provided for the bulk of the STUBs processed.

(3) Vendor Accomplishment. The vendor manufactured or otherwise acquired the ordered item and forwarded it to the NPS Supply Department Receiving Officer with a copy of the vendor's delivery papers. (See subtask 25 on Fig. 1.)

F. RECEIVING AND TRANSFER

The procedures for receiving and transfer of the items which were ordered by the PWM SPs under BPAs were described in paragraph III E. 2. b. (4) above. The procedures for receiving all other items will be described in this section. The copies of the STUBs for FSN items ordered, which had been forwarded to the Supply Department Receiving Officer from EDIT (see subparagraph III E. 7. b. (1) above), and the copies

of the STUBs and purchase documents for non FSN items, which had been forwarded to the Receiving Officer from the Purchasing Branch (see subparagraph III E. 7. c. (2) above), were retained in the Receiving Officer's files. A separate file folder was prepared and kept for each FSN STUB and for each non FSN purchase document. When an item arrived (see subtask 26 on Fig. 1), it had a document attached to it which showed either the purchase document number, if it was a non FSN item, or the STUB number if it was an FSN item. The proper file folder was located using this number and the item was then physically inspected to ensure that it was the item ordered. For complex items this may have required the Receiving Officer to request the assistance of the originator; but according to Ref. 6, this check was normally made by personnel in the Receiving Warehouse. If the item received was not the item ordered, the Receiving Officer took the necessary steps to inform the vendor or agency which supplied the item so the proper part could be supplied. If the item was correct, it was delivered with a copy of the delivery papers to the originator. All WA materials were delivered to the SP.

The SP accepted the item with a copy of the delivery papers and signed a dated certification that he had received the item. This certification was forwarded to the Supply Department Control Division for close-out of the requisition and in the case of non FSN items payment of the vendor.

G. SEGREGATION AND STORAGE

1. Custody

At the option of the SP, items received were retained in his custody or transferred to the custody of the WC who eventually would use them. (See subtask 27 on Fig. 1.) Pipe, electrical conduit, expanded metal and lumber were normally transferred to the custody of the WC. All other items were normally retained in the custody of the SP and stored in one of three secure storage areas controlled by the SP. The location and characteristics of these storage areas are described in subparagraph IV D. 3. a. below. A copy of the shipping papers remained attached to the item when it was placed in storage to allow identification later.

2. Record Keeping Procedures

When an item arrived, the JON shown on the papers received with it contained the SCN of the WA for which it was ordered. The JF for that WA was pulled and the ML on which the item was listed was marked with a note to show that it had been received. However the, location where the item was stored by the SP within the three storage areas was not recorded in the JF, or in any other manner.

H. ISSUE FOR JOB EXECUTION

When the last long lead item for the WA had been received, the SP ordered the BPA items as described in subparagraph III E. 2. b. above. When the job was scheduled for accomplishment, he coordinated with the GF, who was responsible for executing the job, to determine the sequence and timing

for delivery of materials to the job site. The SP then arranged to have the materials delivered. The SP then searched the three storage areas to locate the materials, gathered them and arranged to have them delivered.

IV. IMPROVEMENTS RECOMMENDED

A. GENERAL

Current procedures were found to be in general agreement with the guidelines contained in Refs. 1 and 5 where those guidelines were applicable. In general, however, those guidelines were not directly applicable to the processing of Public Works material orders;and those that were tended to deal with specific requirements such as levels of approval authority, procurement procedures, etc. The improvements recommended in this chapter therefore deal with situations in which it is considered that the efficiency and/or effectiveness of the material ordering process can be enhanced, rather than situations in which requirements have been violated.

Although an effort was made to obtain quantitative data with which to analyze the processing flows, etc., in many cases the quantitative data that could be obtained are averages of imprecisely measured times which are themselves aggregates of delivery, waiting and processing times. The analysis which led to the recommendations made, therefore, and the ultimate decisions on adoption or rejection of those recommendations, must necessarily depend to a large extent on subjective choice. For this reason an attempt has been made to separate all the recommendations and the discussion surrounding them into discrete elements which are independent of the others, and any one or combination of which can be adopted without the others. Conversely, an attempt has been made to identify those which are related.

B. FLOW REFINEMENTS

1. General

Material lead times were relatively short for items drawn from SSS (two or three days except for backorder items) and items ordered by the SPs under BPAs (normally the same day). The longest material lead times were experienced with non local FSN items, which were ordered through NSCO, and with non FSN items, which were ordered using formal procurement procedures through the NPS Supply Department Purchasing Branch.

a. Processing Phases

The lead time for acquisition of these long lead items under current procedures breaks down conveniently into three phases for discussion purposes. Phase 1 refers to those subtasks performed with the ML after release of the WA (subtasks 3 through 12 on Fig. 1); phase 2 refers to those subtasks performed with the STUB (subtasks 13 through 20 on Fig. 1); and phase 3 refers to the remaining subtasks up until the ordered article is received by the SP (subtasks 21 through 31 on Fig. 1). Phases 1 and 2 are internal and controllable by NPS; phase 3 is essentially external and uncontrollable by NPS. This breakdown was convenient primarily because it allowed the most straightforward measurement of the lead time.

b. Measurement of Phases

(1) Direct Measurement. Two different measurement approaches were used to quantify the lead times experienced, a direct elapsed time measurement of the phases and a route slip analysis of the individual subtasks. Phases 2

and 3 were readily measured for each STUB; because the start and stop dates for them were recorded under current procedures as a matter of course; i.e., the STUB release date, the STUB keypunch date (non local FSN items) or purchase document date (non FSN items), and the delivery date to the SP. Phase 1 was less readily measured, because the typical WA was translated into numerous STUBs which were often released at different times, but an indication was at least available by comparing the WA release date and the release dates of the STUBs issued against it. The second quarter of Fiscal Year (FY) 1977 (January through March) was selected as an appropriate sampling period to measure the phases. The period was considered short enough to be manageable, long enough to be adequate and a "typical" quarter, in that it did not include the period of relative inactivity which is common at the end of one FY and the beginning of another. The data gathered is summarized and graphed in Figs. 3 through 5. Briefly they show that the average completion times for each phase are as follows:

	PHASE 1	PHASE 2	PHASE 3
Non local FSN	16 days	7 days	29 days
Non FSN	12 days	18 days	34 days

(2) Route Slip Measurement. No records were kept, on the other hand, of the start and stop dates of the individual subtasks involved. In order to obtain a rough indication of the subtask completion times, therefore, authorization was obtained from the PWO and the Assistant Supply Officer to employ a temporary route slip procedure. Two

different route slips were used, one for Phase 1 and one for Phase 2. The slips were designed in a simple matrix format, listing each individual through whose hands the document was required to pass, and providing a place for the individual to initial and date the route slip when the processing at that point was complete. It was realized that this did not isolate process time from the time the documents spent in in-baskets, in out-baskets and in delivery, but it was considered that a more complex or demanding procedure would deter cooperation from the individuals involved. The route slips were to be attached to each WA which required material procurement and to each STUB prepared by the PWD (excepting STUBs for the purchase of utilities and fuel) during the period from approximately mid August 1977 through mid November 1977.

To extract the processing time for each subtask from a completed route slip, certain assumptions were made and conventions adopted. For example, if the route slip showed that the document passed through the hands of four individuals one day, the processing time for each individual was assumed to be one quarter of a day, etc. Non work days were subtracted from all process times. These times were then averaged for each subtask and the results are shown in summary form in Fig. 6. The sum of the average processing times for the subtasks within phases 1 and 2 are as follows:

	PHASE 1	PHASE 2
Non local FSN	7.7 days	2.7 days
Non FSN	7.7 days	7.0 days

It is quite clear that a divergence existed between the directly measured times, which were from the second quarter of FY 1977, and the route slip times, which were from approximately mid August to mid November 1977. Several factors could have accounted for this divergence.

There may have been an "observer effect"; i.e., the presence of an observer recording their process times may have motivated the individuals involved to improve their speed.

In Phase 1 subtask 9, the review by the PWM GF, which was quite time consuming on occasion, and which was included in the procedures both during the second quarter of FY 1977 and when the research for this thesis began, was deleted prior to the start of the route slip procedure. This deletion was discussed with PWMD in Ref. 4 early in the research period, and the subtask was removed from the flow shortly thereafter. For record purposes, the recommendation to make this removal is still included in subparagraph IV B. 3. a. (2) and V B. 3. below, but obviously no history data on this subtask was obtained from the route slips.

According to Ref. 8, during the second quarter of FY 1977 a vacancy existed in the clerical staff of the Purchasing Branch which delayed STUB processing times in Phase 2 subtask 19, the processing of non FSN STUBs.

In view of the above the route slip data is considered no more than a rough indicator of the processing times for subtasks 3 through 20.

(3) Dummy Route Slip Measurement. In order to generate some data on the time required for documents to simply travel through the flow, permission was obtained to circulate a series of what will be referred to as "dummy" route slips. These dummies consisted of a regular route slip attached to a form memo that requested each addressee to initial and date it as soon as received and forward it to the next addressee in the same manner as a material ordering document. Fig. 7 shows the average circulation times. Procedures and conventions used for tallying the dummies were similar to those explained above for the route slips. Again, it is recognized that these are no more than rough indicators.

c. Number of STUBs Released

In order to determine the quantity of STUBs which were generated by the PWD, two separate counts were made. A count of all STUBs released by PWD (excluding STUBs for the payment of utility bills) from 1 October 1976 through 19 August 1977 was made by the clerks of the PWA Fiscal Branch, and it totalled 5224. This may be projected linearly to approximately 6000 STUBs annually.

A second count was made in order to determine the approximate quantitative mix of the various types and values of STUBs released. For consistency the second quarter of FY 1977 was again selected as a meaningful and manageable sample period. Every STUB released during this period was sorted to show the ones authorized under specific WAs; the ones authorized for work on real property facilities but

under documents other than specific WAs, such as Standings and Service Work Authorizations (SWAs); and the ones authorized for work on Transportation equipment under documents such as Shop Repair Orders (SROs). Within these three major categories, the STUBs were sorted to show the number released into each stream source: SSS, other FSN (NSCO), PWD BPAs (BPA calls made by the SPs vice by the Supply Department Purchasing Branch), and other non FSN. Within each stream source the STUBs were sorted by STUB value. Each group was counted and the results are summarized and shown in Fig. 8.

It is interesting to note that Fig. 8 shows that 53% of the STUBs released were for work on real property facilities which was authorized by other than Specific WAs. Since essentially all work on real property facilities is authorized on either Specific WAs, Standing WAs or SWAs (which are unplanned), and since Standing WAs typically require few materials, this appears to indicate that most materials are being procured for unplanned work. Ref. 1 states that the target percentage for planned (controlled) work is 80 - 85%.

Although not within the scope of this thesis, it appears that the amount of unplanned work being accomplished by the PWD is excessive; and it is recommended that further study be made in this apparent problem area.

d. Internal Versus External Phases

A comparison of the directly measured average times for the completion of Phases 1 and 2 (internal processing) to Phase 3 (external processing) shows that the internal

processing time represents a significant portion (approximately 44 to 47%) of the total lead time for long lead items. As described in Chapter III above and shown in Fig. 1, the current procedures require an ordering document to pass thru the hands of at least 16 individuals before it leaves NPS and four of these individuals handle the documents twice. Interviews with each individual in the flow process indicate that in many instances an individual spent only a few minutes with each document. However, at each additional point in the flow the potential exists for a significant amount of time to be lost in delivery to the desk of the individual, in waiting for the individual to finish other things so he can apply his concentration to the document (in-basket time), in waiting for pickup (out-basket time), and in delivery to the next stop.

It appears that certain refinements can be made which will reduce this internal processing time by several days. The refinements which appear to be the most appealing candidates fall into three categories, those which eliminate double handling by the same individual, those which eliminate unessential individuals from the flow entirely (although they may be provided with copies if necessary) and those which improve the efficiency of the current procedures.

2. Eliminating Double Handling

As shown on Fig. 1, the individuals who handled the documents twice under current procedures were the PWC clerk, the PWA Fiscal clerk, the PWA Fiscal Branch Supervisor,

and the EDIT reviewer. Each of these will be discussed individually and a recommendation will be made in each case.

a. Maintenance Control Division Clerk

The double handling at this point is essentially caused by the fact that PWA assigns the accounting data on WAs, which is addressed in subparagraph IV B. 2. b. below. However, to allow incremental consideration of the situation it is discussed independently.

The PWC clerk initially receives the authorized WA with attached MLs from the PWCD and assigns the SCN (See subparagraph III B. 2. above and subtask 3 in Fig. 1). Later, when the accounting data has been placed on the WA by PWA, it is returned to PWC for extraction of the information for the various monitoring aids kept by the clerk and for duplication of the numerous copies of the WA required (See subparagraph III C. 3. above and subtask 6 on Fig. 1). Three alternative modifications could be made which would eliminate this double handling.

(1) Alternative 1. PWA assign SCN. The WA could be delivered directly to PWA from PWCD and the SCN could be assigned by PWA. However, this would leave PWC with no identification number with which to track authorized WAs until they returned from PWA for extraction of monitoring data and reproduction. This could cause problems in the event one were mislaid.

(2) Alternative 2. PWC assign accounting data. The accounting data could be inserted on the WA by the PWC clerk, all copies could be made and the information extracted

for the PWC monitoring aids in subtask 3. There would be no reason to send the original of the WA to PWA and it could be forwarded directly to PWM. Adoption of this alternative would require significant training for the PWC clerk and, in all likelihood, the addition of at least another clerk in PWC. This alternative is discussed in more detail in subparagraph IV B. 2. b. (2) below.

(3) Alternative 3. PWA accomplish reproduction. After assignment of the SCN, as is presently done, the PWC clerk could extract immediately all monitoring information before delivering the WA to PWA. The accounting data could be assigned and, the reproduction accomplished by PWA before forwarding the WA directly to PWM. Adoption of this alternative would require the Fiscal clerks, who have been trained in selecting the proper accounting data, and performing other accounting functions, to spend their time making the reproductions. A count of the WAs released in Fiscal Year 1977 totalled 635, and the reproduction for this number represents a significant workload. See Fig. 9 for a summary of the WA count.

Reference 9 disclosed that under current procedures, the PWC clerk treated the handling of the WA/ML package as a high priority task. Signed WAs were hand-carried to the clerk by PWCD, the SCN was promptly assigned, and the WA was hand-carried to the PWA office, which is only a few steps away. When the WA was returned with accounting data, again, the information for monitoring was promptly extracted, copies were made and the WA was forwarded to PWM. A review

of the route slips (Fig. 6) shows that subtask 3 consumed an average of 0.3 days and subtask 6 consumed 0.4 days. In view of the conventions adopted for averaging the processing times from the route slips,and the current handling procedures, the processing times for these two subtasks are probably somewhat overstated. Therefore, while double handling is in fact occurring, the close physical proximity of the two offices (PWA and PWC) and the current handling procedures appear to minimize any delays except possibly in-basket time.

It is recommended that Alternative 2 above, PWC assign accounting data, be adopted. This recommentation is coordinated with, and additional advantages are mentioned in the discussion leading to, the recommendation in subparagraph IV B. 2. b. (2) (b) below.

b. Public Works Administrative Division

(1) Background. Under current procedures, the WA was received in PWA and three principal steps were accomplished: the input document for the new JON was prepared, the WA material estimate was checked against the OPTAR balance for material procurement and the accounting data was assigned to the WA (see subparagraphs III C. 1. and 2. above and subtasks 4 and 5 on Fig. 1). Later after the WA had circulated through PWM, SSS and EDIT, the MLs for the long lead (non local FSN and non FSN) items were returned to PWA and three other steps were performed: the accounting data was assigned to the STUBs, the STUBs were typed and the STUB values were subtracted from the OPTAR balance. (See subparagraph III E. 5. above and subtasks 13 through 15 on

Fig. 1.) The current procedures centralized all accounting steps under the Fiscal Branch of PWA. The three most important steps in terms of causing the multiple handling of the WA/ML packages were the steps of checking the WA material estimate against the OPTAR balance and assigning the accounting data to both the WAs and the STUBs.

The WA material estimate must be checked against the OPTAR material balance to prevent overexpenditure of funds, and the accounting data must be entered on the WA before it is duplicated and distributed to prevent the proliferation of incomplete copies. This dictates that these two tasks be performed very shortly after the WA is authorized and the current procedures provided for this. If all the STUBs could have been prepared immediately following these two steps, it would have prevented double handling by PWA. However, every item on each ML did not require a STUB, and it was essentially impossible for the PWA clerk who accomplished these first two critical tasks to determine the proper items for which to prepare STUBs. Principally, the clerk couldn't determine which of the non FSN items would be purchased by the SPs under BPAs. The SPs had to communicate with the vendors to verify off-the-shelf availability of the items. The MLs for these items were then held by the SPs until the items from all other stream sources had been received, before the BPA orders were placed and call numbers were assigned. (See subparagraph III E. 1. above.) STUBs for BPA items therefore, which accounted for approximately 41% of the WA STUBs issued according to Fig. 8, could not have been typed at this time.

It is true that the clerk could have determined with reasonable accuracy those FSN items which would be filled from SSS, because the P/Es had listed them on separate sheets; but SSS item orders currently were filled based on the MLs themselves in advance of STUB preparation. There is no advantage therefore in typing these STUBs earlier. It is also true that the clerk could determine those FSN items which would be forwarded to NSCO, and STUBs could be prepared and forwarded directly to the Supply Department at this point (subtask 5 on Fig. 1). This would eliminate double handling at least for non local FSN STUBs and could cut the internal processing time for them by approximately 6 days (elimination of subtasks 7 - 13). However, a reduction in procurement time for non local FSN items probably would be ineffective for WAs which also required non FSN items (the typical case), unless the procurement time for them could be similarly reduced.

Before considering alternative processing flows to eliminate the multiple handling, certain points should be understood.

The preparation of STUBs includes the selection of proper accounting data for the STUBs.

The selection of accounting data for STUBs is essentially the same as the selection of accounting data for WAs.

In the PWD, accounting data is selected from a manual which is locally prepared on an annual basis (and continuously updated) and which lists every JON available

for PW charges, all accounting data for each JON and the description of the goods and services which may be purchased under each JON.

The JONs available are numerous, the descriptions are brief and general and in some cases the lines of distinction between them are fine. According to Ref. 10, errors in selecting the proper accounting data are common unless personnel are experienced and selections are carefully checked.

Errors in the selection of accounting data can have a significant effect on resource expenditures and future resource allocations.

In view of the above, centralization of the responsibility for accounting data selections in a very few highly trained and well supervised individuals is desirable.

The typical WA requires numerous STUBs. In addition, STUBs are prepared for many requirements other than those authorized under a WA, such as SWAs, SROs, utility payments, etc. The STUB volume originating in the PWD is therefore much greater than the WA volume (486 WAs versus approximately 6000 STUBs in FY 1977.

Material orders for these other requirements have origination points and flow sequences different from those for WAs, and therefore the effect on the other flow sequences should be carefully considered before changes are made in the present sequences. Since material ordering

for these other requirements are outside the scope of this thesis they will only briefly be addressed.

(2) Alternatives. There are three basic alternatives for eliminating this multiple handling and streamlining the flow of material ordering documents, and each is discussed separately below. These alternatives are considered basic; because in each case described, the PW division which prepares STUBs prepares all the STUBs for the entire department. In addition numerous combinations are possible in which certain types of STUBs are prepared by PWA and the remainder by PWM. These combinations will not be discussed in detail, as the benefits and disadvantages are covered in the basic alternatives. Partial flowcharts have been prepared for each basic alternative showing only the subtasks affected. In order to make these flowcharts more comparable, and therefore more meaningful, it was assumed that the other recommendations made in this thesis have been accepted and implemented.

(a) Alternative 1. PWC assign accounting data and PWA prepare the STUBs. A partial flowchart for this alternative is provided as Fig. 10. Briefly, under this alternative, PWC would check the WA material estimate against the OPTAR material balance before releasing the WA. The PWC clerk would then assign the SCN and the accounting data and enter them on the WA and each ML sheet. A copy of the WA would then be forwarded to PWA simultaneously with sending the original WA to PWM. PWA would prepare the JON input document from this copy of the WA and, if considered necessary, check the accounting data. In PWM, after the SP had withdrawn

the MLs for BPA items and stored them in the JF, and withdrawn the MLs for SSS items and sent them to SSS, he would send the remaining long lead items directly to PWA for STUB preparation in the current manner.

This alternative eliminates all multiple handling within PWA except for such tasks as reproduction of signed documents, etc. To adopt it, PWCD must be provided with a periodic allocation of material funds to manage, and he must establish procedures to ensure it is properly managed. This has the desirable result of bringing the PWCD into the financial control of the maintenance effort, an important aspect of maintenance control, but an aspect in which he presently participates in only a peripheral way according to Refs. 2 and 11. However, it would require the training of the PWC clerk in selection of accounting data. The transfer to PWC of this function and the function of keeping the material OPTAR balance might require the augmentation of the PWC clerical staff. If so, it would presumably allow a commensurate reduction in the PWA clerical staff. Under this alternative all STUBs are still returned to PWA for preparation, a time consuming process. However, the flow sequence for material orders under all other types of documents (SWAs, SROs, etc.) will be essentially unaffected.

The complete processing time for subtask 13 was approximately 2.3 days according to the route slips (See Fig. 6). It is recognized that this included the

guard mail delivery time from EDIT to PWA as well as processing time by the PWA Fiscal clerk. The delivery time from EDIT to PWA was approximately 1.2 days according to the dummy route slips (subtask 13 on Fig. 7). The combination of these figures gives a rough indication that the processing time alone for subtask 13 was approximately 1.1 days which appears excessive. The route slip measurement may be distorted for this subtask, because the data available were meager (only nine Phase 1 route slips actually completed the full circuit through subtasks 12 and 13). However, the data indicates at least the possibility of a bottleneck at this point, and if STUB preparation remains in PWA, further study is recommended in this area.

(b) Alternative 2. PWC assign accounting data and PWM prepare the STUBs. A partial flowchart for this alternative is provided as Fig. 11. This alternative would be identical to Alternative 1 above until the MLs arrived in PWM, the SP had withdrawn the MLs for BPA items to store them in the JF, and had withdrawn the MLs for SSS items and sent them to SSS. The SP (or another member of the PWM staff) would then type the STUBs for all remaining long lead items required, send the originals direct to the Supply Department with a copy to the Comptroller and send a copy to PWA for subtracting from the actual OPTAR balance. When the SP had placed the calls for BPA items (after all long lead material was already on hand as explained in paragraph III E. 2. above), the STUBs for these items would be prepared by PWM and similarly forwarded. Likewise, when the DIRs had been prepared by SSS

showing the items issued there (see paragraph III E. 3. above), they would be returned to PWM for preparation of the consolidated STUBs, which would then be sent to SSS in the normal manner. In addition, all other STUBs would also be prepared by PWM, including those for the procurement of materials for work authorized under other documents (SWAs, SROs, etc.) and for administrative supplies, engineering supplies, etc.

This alternative completely eliminates PWA from the material ordering process for WAs; and it does not introduce multiple handling within PWM, other than possibly for such tasks as a second handling of the STUB by the clerk after it has been signed by the supervisor. As discussed in more detail in subparagraph IV B. 3. c. below, a series of thresholds of STUB approval authority could keep even this multiple handling to a minimum. In addition, this eliminates the need to deliver the MLs to PWA for STUB preparation, a step which, as stated above, is time consuming.

It requires that certain PWM personnel, in addition to the PWC personnel mentioned in Alternative 1 above, be trained in the selection of accounting data for STUB preparation. It would also undoubtedly require augmentation of the PWM clerical staff, again presumably with a commensurate reduction in the PWA clerical staff. The principal risk in this alternative is the potential that copies of some of the STUBs prepared in PWM would fail to reach PWA. This risk could be reduced significantly if a simple STUB log sheet listing every STUB number released were kept by the

PWM clerk who prepared the STUBs, and a copy of the log sheet were delivered to PWA daily with the STUB copies.

This alternative would have the desirable results of removing PWA from the day to day details of STUB preparation and allowing this division to focus on the accounting and management analysis aspects of their functions. In addition this would place STUB preparation near the SPs where many of the questions which arise regarding nomenclature, unit of issue, etc., could be answered more quickly.

(c) Alternative 3. PWA assign accounting data and PWM prepare the STUBs. A partial flowchart for this alternative is provided as Fig. 12. Briefly the procedures under this alternative would be identical to the current procedures through subtask 10 on Fig. 1. From that point on it would be identical with Alternative 2 above. Under this option, the only multiple handling remaining is by the PWC clerk after the assignment of accounting data by PWA. (See subtask 6 on Fig. 12.) PWCD remains essentially uninvolved in the financial aspects of Maintenance Control but PWA is freed from the tedium of STUB preparation and is more able to focus on accounting and management analysis.

(3) Recommendation. It is recommended that Alternative 2 above be adopted, with PWC assigning the accounting data and PWM preparing the STUBs.

c. Technical EDIT Reviewer

The EDIT reviewer initially received the entire ML package from SSS and reviewed the non local FSN

items to ensure that the FSN, nomenclature, unit of issue and price were correct. He also reviewed the non FSN items to ensure that they could not be ordered as FSN items through the Navy Supply System (see paragraph III E. 4. above and subtask 12 on Fig. 1). Approved MLs were initialed by the reviewer. Later after the MLs were returned to EDIT for the second time with prepared STUBs attached, he checked for his initials on the MLs and only reviewed those which had not been initialed (see subparagraph III E. 7. a. above and subtask 17 on Fig. 1). While his first review could conceivably catch errors which might cause the potential rejection of STUBs after typing, Ref 12 indicated that the numbers of mistakes caught in the initial review of the MLs was extremely low; and that to the best of his memory, none had been caught in approximately the past year.

The initial review of the MLs by EDIT appears to be of very low benefit in relation to the time consumed. If it is eliminated the later review may still be made after the STUBs are typed. Each error found, and presumably there will continue to be relatively few, may be hand corrected by the EDIT reviewers. An analysis of the route slips (Fig. 6) shows that the first review of the MLs, subtask 12, consumed an average of 1.3 days, but this undoubtedly understates the amount of time which could be saved in the processing of each WA STUB by eliminating it; because, as explained in Chapter III above, the deliveries of MLs from SSS to EDIT and from EDIT to PWA are relatively infrequent. It is recommended that the initial review of MLs by EDIT be eliminated.

3. Eliminating Routing Points

Under current procedures every WA/ML package was routed through the hands of several individuals who either reviewed the packages for familiarization only, performed a function which could have been as effectively performed using a copy of the package without detouring the original or who needed to review and perform their function only for certain high value material requirements rather than all items. Each of these individuals will be discussed.

a. Public Works Maintenance Division

(1) Director. Current procedures required every WA package to be delivered by the PWM Master Scheduler to PWMD for assignment of the job to a GF and hence to the SP who supported that GF. (See paragraph III D. 2. above and subtask 8 on Fig. 1.) If PWMD were out of his office for an extended period inspecting work sites, etc., and a WA were received during that period, the potential existed for a delay in the start of procurement processing. In addition the types of work done by the WCs supervised by one GF are easily distinguishable from those done by the WCs supervised by the other. In virtually every case, therefore, a prediction can be made by the Master Scheduler, based on the type of work which is predominant in the WA, as to which GF will be assigned.

It is recommended that PWMD be removed from the mainstream of the material ordering document flow and that his review be performed using a copy of the WA.

(2) General Foreman. Under current procedures the WA was delivered from PWMD to the GF assigned for his review prior to start of procurement action (see paragraph III D. 3. above and subtask 9 on Fig. 1). The GF checked for errors in the design and in development of the MLs. This is a prudent step; but it was stated in Ref. 13, that in the very few cases where errors were found they were virtually always corrected by the ordering of additional materials. The start of procurement processing was therefore being delayed for a function which could have been performed simultaneously, using a copy of the WA. If the GF were out of his office for an extended period during which the WA were received, and/or if he chose to make a site visit, the delay could have been significant.

Again, it is recommended that the PWM GF be removed from the mainstream of the material ordering document flow and that his review be performed using a copy of the WA. A recommended procedure is to route the one reviewed by the PWMD to the GF for his subsequent review. In instances where the requirement for additional material is found by the GF, and presumably these would continue to be infrequent, the additional items can be obtained in a follow-on order. (This recommendation already has been implemented and is included here for record purposes only. See subparagraph IV B. 1. b. (2) above.)

b. Shop Stores

Materials from several stream sources, such as SSS, non local FSN and non FSN, are often required for a

single WA. As discussed previously, when the P/E prepares the WA he makes a separate ML sheet for each WC, and within each WC he makes a separate sheet for each stream source. Under current procedures, after the BPA items had been removed by the SPs, these ML sets remained intact and traveled through the entire flow process as a single package.

This procedure required the ML sheets for long lead items to travel with the other ML sheets to SSS and remain there until all SSS items had been posted and pulled from inventory. (See paragraph III E. 3. above and subtask 11 on Fig. 1.) According to Ref. 6, processing time in SSS can require from one to three days. This was confirmed by the route slips which showed that subtask 11 consumed between 0.5 and 2.5 days with an average of one day. (See Fig. 6.) This is needless delay time for long lead items in which their processing could be underway.

It is recommended that the MLs for long lead (non local FSN and non FSN) items be separated by the PWM SPs from the MLs for SSS items and sent directly to the individual who will prepare the STUBs, bypassing SSS.

c. Public Works Administrative Division Director

Under current procedures all STUBs prepared by the PWA Fiscal clerks were signed by PWAD. (See subparagraph III E. 5. a. (4) and III E. 5. b. (4) above and subtask 15 on Fig. 1.) Many of these STUBs were extremely low value items (Fig. 8 shows approximately 22% less than $10 each; 58% less than $50 each; and in the case of STUBs for WA materials, the total job itself had already been approved

by a Public Works Department Division Director or higher. This job approval certainly included approval of the material purchases required to accomplish the job. There is no apparent need, therefore, for STUBs for WA materials to be signed by anyone other than the clerk who prepares the STUBs. This will eliminate the necessity for STUBs to await signature when the PWAD is out of the office. In connection with this, two points are pertinent.

First, under current procedures there was no way for the PWA Fiscal clerk to distinguish a WA stub from any other type STUB. If the responsibility for STUB preparation remains in PWA, a method for so distinguishing is needed; and this is discussed in subparagraph IV B. 4. a. below.

Second, while not the subject of this thesis, there likewise appears to be no reason for PWAD to sign all STUBs for procurement of non WA materials; although he should perhaps sign those of high value. As stated in subparagraph IV B. 1. c. above approximately 6000 STUBs were released annually. The requirement for PWAD to sign them all represents not only a restriction in the STUB flow but a significant drain on the time of a Division Director. If STUBs continue to be prepared and released in PWA, it appears that a series of thresholds of approval authority could be established with the clerks who prepare them authorized to release low value STUBs (e.g., $100 or less), which are the most numerous type; the supervisor of the Fiscal Branch authorized to release STUBs up to a higher value (e.g., $500 or less); and PWAD required to release only STUBs above that level, of which there were

relatively few. Fig. 8 shows only 6% of the STUBs released were above $500.

It is recommended that a series of thresholds of approval authority be established and that the STUB preparation clerks be authorized to release low value STUBs. It is further recommended that the STUB preparation clerks be authorized to release all STUBs procured under WAs.

d. Comptroller Department Budget Division

This is a minor delay, but thorough analysis requires discussion. Under current procedures, in accordance with Ref. 14, every STUB released by PWD (except STUBs for SSS items) was delivered to a clerk in the Budget Division of the Comptroller Department, so the green copy of the STUB could be pulled and held for posting. (See paragraph III E. 6. above and subtask 16 on Fig. 1.) There are certainly other ways of getting the STUB copy into the clerk's hands without detouring the STUB original and delaying the start of processing by the Supply Department.

The obvious alternative is for the clerk who prepares the STUB in the PWD to pull and forward the green copy to the Comptroller Department at the same time as the original is released to the Supply Department. There are two factors which should be evaluated in considering this change.

(1) Forwarding the STUBs through the Comptroller Department provides positive assurance that STUBs will not be released without being recorded in the Comptroller's memorandum accounts. If the green copy only were sent to the Comptroller, with the original simultaneously being sent to

the Supply Department, it would be possible for failures to occur in delivering the green copies; and overexpenditure of funds could potentially result. According to Murphy's law, if such a failure is possible, it is therefore probable. On the other hand, it is true that memorandum accounts also are kept by PWD; and this makes the probability of such an over-expenditure very unlikely.

(2) If such an overexpenditure did occur and were detected by the Comptroller Department, future STUBs against the same account or OPTAR could theoretically be stopped by the Budget Division, before they were forwarded to the Supply Department for processing. This would depend of course on the promptness with which the STUBs were posted to the Comptroller's memorandum accounts and the ability of the Budget Division to spot the improper STUB and remember that the account against which it was drawn was overexpended.

In an interview with the Supervisory Budget Analyst in the Budget Division (Ref. 7), she stated that, in her recollection, there had been no overexpenditures by PWD in the past year or so.

An analysis of the routing slips shows that approximately 0.6 days were consumed in sending the STUBs through the Comptroller Department. It must be understood that some portion of this time is the time required for the STUBs to be delivered to the Comptroller from PWA; and if the Comptroller were bypassed most of that delivery time would still be required since the Supply Department, the next routing stop, is relatively near the Comptroller Department. Although

the net time which could be saved by removing the Comptroller from the mainstream of the document flow is not discernible, the in-basket time, processing time and delivery time to the Supply Department certainly would be saved and a potential for delays would have been removed.

It is recommended that the Comptroller be removed from the mainstream of the material ordering document flow and that the green copy only of the STUB be forwarded by the STUB preparation clerk to the Comptroller at the same time the original is sent to the Supply Department.

e. Supply Department Control Division Director

Under current procedures, all non FSN STUBs received by the Supply Department were separated by EDIT from the FSN STUBs and sent to the Director of the Control Division for review. (See subparagraphs III E. 7. a. and III E. 7. c. (1) above and subtask 18 on Fig. 1.) His review is made to familiarize himself with the items being ordered; and if any problems or errors are observed by him, they are left for resolution by the Purchasing Branch. A review of the route slips to determine the processing time consumed in this step is inconclusive, as the Control Division Director rarely initialed and dated the route slips. However, in virtually all cases, the Purchasing Branch Supervisor did initial and date the route slip, when it was assigned to a buyer (subtask 19; and these dates were usually the same date the STUB arrived in EDIT. The time consumed was therefore less than one day. Nevertheless, it is doubtful that a person scanning thousands of STUBs per year can actually obtain any useful information

from such a review, and each additional stop in the flow represents at least the potential for a problem. It is recommended that non FSN STUBs be delivered directly to the Purchasing Branch from EDIT and bypass the Control Division Director.

4. Improvements in Material List Handling

a. Priority Processing of Long Lead STUBs

It is recommended that the STUBs for long lead items be processed by the STUB preparation clerks on a higher priority basis than STUBs for BPA or SSS items. This will prevent the STUB preparation for BPA and SSS items, which have already been received by the time STUBs are prepared, from delaying the STUB preparation for long lead items.

b. Identification of Material Lists for Work Authorizations

This subparagraph applies only if STUB preparation remains the responsibility of PWA. In subtask 13 of Fig. 1, there was no way for the PWA clerk who prepared the STUBs to distinguish the items required for WAs from any other items. To explain, STUBs were prepared by the PWA clerks in response to the MLs received, and the MLs may have been for work authorized under any one of a variety of documents: such as SWAs, SROs, etc., as well as WAs. The WAs were unique, however, in several respects: in general they required more long lead materials, they had each been approved by a PWD Division Director or higher, and they had all previously passed through PWA to have accounting data entered. None of these unique characteristics were visible to the PWA clerk

when she received a ML for WA long lead items; however, because they were not labeled in any way, and all copies of the WA were retained by the SP in PWM,with only the MLs having been forwarded for procurement action.

If a copy of the WA cover sheet were forwarded to PWA with the ML package for long lead items, they would be distinguishable, and certain advantages would be obtained. The researching of the accounting data, which is accomplished for the WA in subtask 4, would not need to be repeated for the MLs in subtask 13; and the STUBs for the WA which has been approved as a whole could all be signed and released by the clerk. In addition, the description on the MLs of the work to be done, which were laboriously hand written on each sheet by the P/Es to allow the proper selection of accounting data, could be eliminated;since the WA summary sheet will include a complete description.

If STUB preparation remains in PWA, it is recommended that a copy of the WA cover sheet be attached by the SP to each ML package for long lead items forwarded to PWA.

C. IMPROVEMENTS IN MATERIAL EXPEDITING

1. Assignment of Responsibility

Interviews and discussions with the individuals involved in the material ordering process within the PWD indicated that confusion existed as to where the responsibility rested for the expediting and follow-up of materials on order. In the past various individuals, both within PWC and PWM, had

attempted to expedite materials. In addition, the discussions indicated that confusion existed as to the proper person to contact within the Supply Department for obtaining status information and as to the identification numbers and other information that person would need.

The need arose frequently to expedite material, both for urgent jobs and for routine jobs with long overdue materials. No known Navy-wide guidelines for performing expediting exist, and the assigment of responsibility is at the option of the PWO. According to Ref. 15, it has been observed to be generally effective at other activities to centralize the responsibility for material expediting in one or two individuals who know the supply contacts, who know the item identification information needed by these contacts and who can record the status information obtained. This usually saves time and prevents duplication of effort. The responsibility can be assigned to either PWC or PWM but is typically assigned to PWM. Since at NPS the JFs which show material availability are kept by the PWM SPs, and status information on outstanding orders could be kept in the JFs; the SPs are the logical choice.

Assignment of the responsibility to the SPs is recommended. It is further recommended that the individuals so assigned be instructed to immediately contact the Supply Department Control Division Director, and the contact personnel he designates, to clarify and agree on the desired local procedures. Based on experience at other activities and interviews in Refs. 12 and 15 through 17, the procedures described below are recommended.

2. Procedures

a. Tickler File

The most important aid in a follow-up/expediting system is the development and use of a good tickler system, and the establishment of one for the material expediters is recommended. It must be simple and quick, or it won't be used; and it must be effective to be worth using. The system recommended in Ref. 15 is a simple calendar file which is checked each day and which shows the jobs that should be expedited that day. A standard flip-page desk calendar was suggested. As each WA arrives, the date for follow-up should be marked on the calendar page an appropriate length of time in the future. The appropriate length of time is a mangement choice; but for routine jobs, it should be slightly longer than the average time required to complete Phases 2 and 3 for long lead items. Based on Figs. 4 and 5, 45 - 60 days is recommended. For urgent jobs, it should be less.

The JFs for the jobs to be followed-up that day should be examined to determine the STUB numbers for the outstanding items. Status on these STUBs should be requested from Supply, and a second follow-up date should be marked on the calendar 30 days or so in the future.

b. Supply Department Contacts and Procedures

To be efficient, the individuals who expedite should know the proper contact points in the NPS Supply Department and the identification information they require. The general stream source of the material determines the proper contact point and identification information.

(1) Non Local FSN Items. The Issue Control Branch of the Control Division should be contacted for expediting non local FSN items and, according to Ref. 12, the STUB number provides sufficient identification to make the check. A history file of all outstanding STUBs is kept here; and unsolicited status information is routinely received here from the supplying agency, i.e., NSCO, SPCC, etc. If unsolicited status is received and is unfavorable, i.e., cancellation, order partially filled and remainder killed, etc., the originator is notified. If the status is favorable, the status card is simply filed in the history file. If status is requested by the originator and current status has not been received, Issue Control will perform a trace on the requisition and forward the information to the originator.

(2) Non FSN Items. The Receipt Control Branch of the Control Division should be contacted for non FSN items. According to Ref. 16, the STUB number provides sufficient identification information; but for those items procured under a Purchase Order (all except BPA and COD items), the status check can be performed much more efficiently if the purchase order number is provided to Issue Control by the originator. Issue Control will contact the vendor who holds the purchase contract, determine the expected shipping date and advise the originator.

c. Recording

A copy of each purchase order issued by the Purchasing Branch of the Supply Department is provided to the originator, i.e., the PWD. The individuals within the PWD

who are resposible for expediting should record these purchase order numbers in the JF in a retrievable manner to speed the expediting process. Likewise, it is recommended that all status information be recorded in a retrievable manner. Entering the data in the JF on the copy of the material list for the item is recommended.

D. IMPROVEMENTS IN STORAGE AND HANDLING

1. General

One of the most important, if not the most important, tasks in the efficient and effective handling of WA materials is the custody and management of items between the time of their receipt on station and their issue for execution of the job. A considerable dollar value is normally invested in these materials; therefore, careful handling to prevent damage and security to prevent pilferage are important. In addition accurate records of the items on hand and the jobs they are being held for must be kept. If they are not, materials can be easily lost, necessitating reorders of the same item, which can increase job accomplishment times and costs significantly.

2. Custody

Under current procedures, custody of WA materials received by PWM was either retained by the SP or, at his discretion, they were released to the WC Supervisor to hold until all materials had arrived and job accomplishment could start. In general WC Supervisors have neither secure storage locations nor adequate record keeping for proper storage and

safeguarding of WA materials, and this is considered a risky practice. It is recommended that all WA materials be retained in the custody of the SP until issued to the WC Supervisor immediately prior to job accomplishment. The only exception to this recommendation is common sized lumber and wood products because of their high bulk and normally short procurement lead time.

3. Physical Improvements

a. Existing Assets

The areas used for secure storage of materials procured for specific jobs will be referred to as Segregated Storage. Three such areas presently exist at NPS. Two relatively small lockable rooms were utilized: one in Bldg. 226 with approximate dimensions of 16ft long, 12ft wide and 10ft high, and one in Bldg. 225 with approximate dimensions of 39ft long, 20ft wide and 14ft high. In addition, a fenced and covered storage yard was available adjacent to Bldg. 328 with approximate dimensions of 66ft long, 26ft wide, and 10ft high.

Access to these storage areas was extremely poor. The only access to the room in Bldg. 226 was a common personnel door, less than three feet wide, which communicated to a wide hallway. Items could be delivered to one end of the hallway by forklift but then typically had to be transferred to a hand truck for movement into the room. Double handling and inefficiency were virtually unavoidable. Access to the room in Bldg. 225 was from a paved roadway; but the double door opening was less than six feet wide,and a forklift

carrying sheetrock, for example, could not enter loaded. Sheetrock had to be hand moved into the room from the roadway, a task which was not only difficult, but which typically resulted in damage to the sheetrock, according to Ref. 13. No rack for storage of the sheetrock was installed and the sheets were commonly stacked on the floor in the middle of the room. This prevented forktruck circulation within the room and necessitated the hand movement of cement bags to their storage areas, a back breaking job which was difficult to accomplish without damaging the bags, according to Ref. 13. Access to the fenced storage yard was through a double gate opening which was less than eight feet wide, not wide enough for a forklift to enter carrying ten foot lengths of pipe, the most common dimension.

The storage areas had only a few storage aids, such as bins, shelves, pallet racks, etc., and much of the volume available was therefore unusable. Gear was typically stored on the floor in a haphazard manner, which required excessive hand lifting and carrying to bring in or extract items and a search to find them when needed.

Although, according to Ref. 13, the amount of storage space required varied considerably with the time of year and types of jobs awaiting accomplishment, the volume of storage space presently allocated to this use appears to be less than ideal, even if all available volume were well utilized. In addition the scattered locations reduce its utility.

b. Recommended Improvements

The improvements recommended in this section are based on the general guidelines provided in Refs. 15 and 17 and on personal observation by the author of similar operations at other Naval activities. Eventual consolidation of the two interior areas into one larger area near the fenced yard is a recommended goal. This would provide more flexibility in the use of the storage space and facilitate control of the storage operation. There appears to be potential for accomplishing this goal by rearrangements within Bldg. 226. An option which could be considered is consolidation of both Segregated Storage rooms and the central pre-expended bin area, which presently exists in Bldg. 500, all into one location in the west end of Bldg. 226. The great advantage of this consolidation would be the potential to utilize the present custodian of the pre-expended bin area as custodian for the Segregated Storage materials as well.

Whether the existing areas are retained or a new area is developed, a number of improvements are recommended. Access doors to all areas should be widened to a minimum of 10 ft, or preferably 12 ft. A variety of storage aids, such as bins, shelves and pallet racks, should be installed; and each compartment in each bin,shelf or rack should be conspicuously labeled with a simple grid address system (e.g., row C, bin 12, etc.). Layout of the storage aids should be considered carefully to allow an open receiving area inside each access door,where materials may be temporarily staged and left secure (for example overnight) until they can

be stored in their proper place. Circulation and access aisles should be planned appropriately for the manner in which the items to be stored will be delivered, i.e., fork truck, hand truck, hand-carried, etc. The bulkiest and most difficult items to handle, sheetrock, cement bags, conduit and pipe, should be considered first as their location will influence the design of the remainder of the area.

4. Procedural Improvements

a. Store Material by Job

Currently, material received was stored unsystematically in the nearest handy location. Retrieval of the items was time consuming, and on occasion it was unsuccessful according to Ref. 13.

Once adequate storage aids are in place, it is recommended that all materials for one job be stored in the fewest possible number of compartments (bins, shelves or racks). In addition, items for more than one job should not be stored in the same compartment. The compartment should be temporarily labeled with the SCN of the job for which materials are being held. The use of "Bulldog" card clips and 3x5 cards marked with a felt-tip pen is a suitable and inexpensive labeling method. The varying sizes and types of the material stored and the availability of empty compartments may require that the items for one job be stored in several different locations; however, if compartment labels are used and storage locations are recorded as discussed below, the items should be relatively easy to retrieve.

b. Record Storage Locations

Under current procedures the storage locations of material held were not systematically recorded. These procedures relied upon the memory of the SP and required a search of the storage rooms to locate all items required for a WA. Loss of items and the necessity for reordering were not uncommon, according to Ref. 13.

It is recommended that the JF be used as the record of storage locations. As each item is received, the compartment address should be entered on the copy of the ML retained in the JF. This should reduce the searching required and the loss of items.

V. CONCLUDING SUMMARY

A. GENERAL

A study was conducted from July 1977 through November 1977 of the procedures for obtaining materials for major jobs on real property facilities by the Public Works Department (PWD) of the Naval Postgraduate School (NPS). The purpose was to examine material processing procedures for PWDs in general, using NPS as a model. The study was limited to those jobs authorized on Specific Work Authorizations (WAs).

The current procedures were described in detail in Chapter III and a flowchart depicting these procedures was developed and is shown in Fig. 1. Problem areas were discussed and specific recommendations for improvements were made in Chapter IV and a flowchart depicting these recommended procedures was developed and is shown in Fig. 13. For convenience, a brief summary of these recommendations is provided below, keyed to the sequence of subtasks shown in Fig. 1. While these recommendations are specifically directed at current NPS procedures, many will have applicability at other Naval activities with PWDs.

B. RECOMMENDATIONS

1. It is recommended that the responsibility for assignment of accounting data on WAs be reassigned to the Public Works Maintenance Control Division (PWC) from the Public Works Administrative Division (PWA). (See subtasks 3 and 4 and subparagraph IV B. 2. a. above.)

2. It is recommended that the Director of the Public Works Maintenance Division (PWM) be removed from the mainstream of the material ordering document flow and that his review be performed using a copy of the WA. (See subtask 8 and subparagraph IV B. 3. a. (1).)

3. It is recommended that the PWM General Foreman be removed from the mainstream of the material document flow and that his review be performed using a copy of the WA. (See subtask 9 and subparagraph IV B. 3. a. (2) above.) This recommendation has already been implemented and is included here for record purposes only. (See subparagraph IV B. 1. b. (2) above.)

4. It is recommended that the material lists (MLs) for long lead (non local Federal Stock Numbered (FSN) and non FSN) items be separated by the PWM Shop Planners (SPs) from the MLs for Shop Stores (SSS) items and sent directly to the individual who will prepare the material requisitions (STUBs), bypassing SSS. (See subtask 10 and subparagraph IV B. 3. b. above.)

5. It is recommended that the responsibility for preparing all material requisitions be transferred to PWM from PWA. (See subtasks 10 and 13 and subparagraph IV B. 2. b. above.)

6. It is recommended that the STUB preparation clerks be authorized to release all STUBs procured under WAs (See subtask 10 or 13 and subparagraph IV B. 3. c. above.)

7. For STUBs other than those procured under WAs it is recommended that a series of thresholds of approval authority be established, with the STUB preparation clerks authorized to release low value STUBs and with successively higher release thresholds for the clerks' Supervisor, Division Director and the APWO. (See subtask 10 or 13 and subparagraph IV B. 3. c. above.)

8. It is recommended that the STUBs for long lead items be processed by the STUB preparation clerks on a higher priority basis than STUBs for BPA or SSS items. (See subtask 10 or 13 and subparagraph IV B. 4. a. above.)

9. If STUB preparation remains the responsibility of PWA (instead of transferring it to PWM as recommended above) it is recommended that a copy of the WA cover sheet be attached by the SP to each ML package for long lead items forwarded to PWA. (See subtask 10 and subparagraph IV B. 4. b. above.)

10. It is recommended that the initial review of the MLs by the technical editors in the Control Division of the Supply Department be eliminated. (See subtask 12 and subparagraph IV B. 2. c. above.)

11. It is recommended that the Comptroller Department be removed from the mainstream of the material ordering document flow and that the green copy only of the STUB be forwarded to the Comptroller by the STUB preparation clerk at the same time the original is sent to the Supply Department for processing. (See subtask 16 and subparagraph IV B. 3. d. above.)

12. It is recommended that the Director of the Supply Department Control Division be removed from the mainstream of the material ordering document flow process. (See subtask 18 and subparagraph IV B. 3. e. above.)

13. It is recommended that the responsibility for material expediting be assigned to the PWM SPs. (See paragraph IV C. 1. above.)

14. It is recommended that the Director of the PW Division to which material expediting responsibility is assigned establish locally agreeable contacts and procedures with the Director of the Supply Department Control Division. (See paragraph IV C. 1. above.)

15. It is recommended that all status information obtained by the material expediters be recorded in a retrievable manner. (See subparagraph IV C. 2. c. above.)

16. It is recommended that all WA materials (except common sized lumber and wood products) be retained in the custody of the SP until issued to the Work Center Supervisor immediately prior to job accomplishment. (See paragraph IV D. 2. above.)

17. It is recommended that the Segregated Storage areas be consolidated into fewer locations, all in close proximity. (See subparagraph IV D. 3. b. above.)

18. It is recommended that all entryways into Segregated Storage areas be a minimum of ten feet wide. (See subparagraph IV D. 3. b. above.)

19. It is recommended that sufficient storage aids be installed in each Segregated Storage area to allow maximum

utilization of the volume, that each storage compartment be labeled with a visible address and that circulation aisles between storage aids be carefully designed to facilitate placement and retrieval of the items planned for storage. (See subparagraph IV D. 3. b. above.)

20. It is recommended that a clear receiving area be provided inside each access door to Segregated Storage where materials may be temporarily staged and left secure. (See subparagraph IV D. 3. b. above.)

21. It is recommended that all materials for one job be stored in the fewest possible number of compartments, that items for no more than one job be stored in one compartment and that each compartment be labeled with the Shop Control Number (SCN) of the job for which materials are being held in Segregated Storage. (See subparagraph IV D. 4. a. above.)

22. It is recommended that the compartment address of each item stored in Segregated Storage be recorded in the job folder. (See subparagraph IV D. 4. b. above.)

C. AREAS FOR FURTHER STUDY

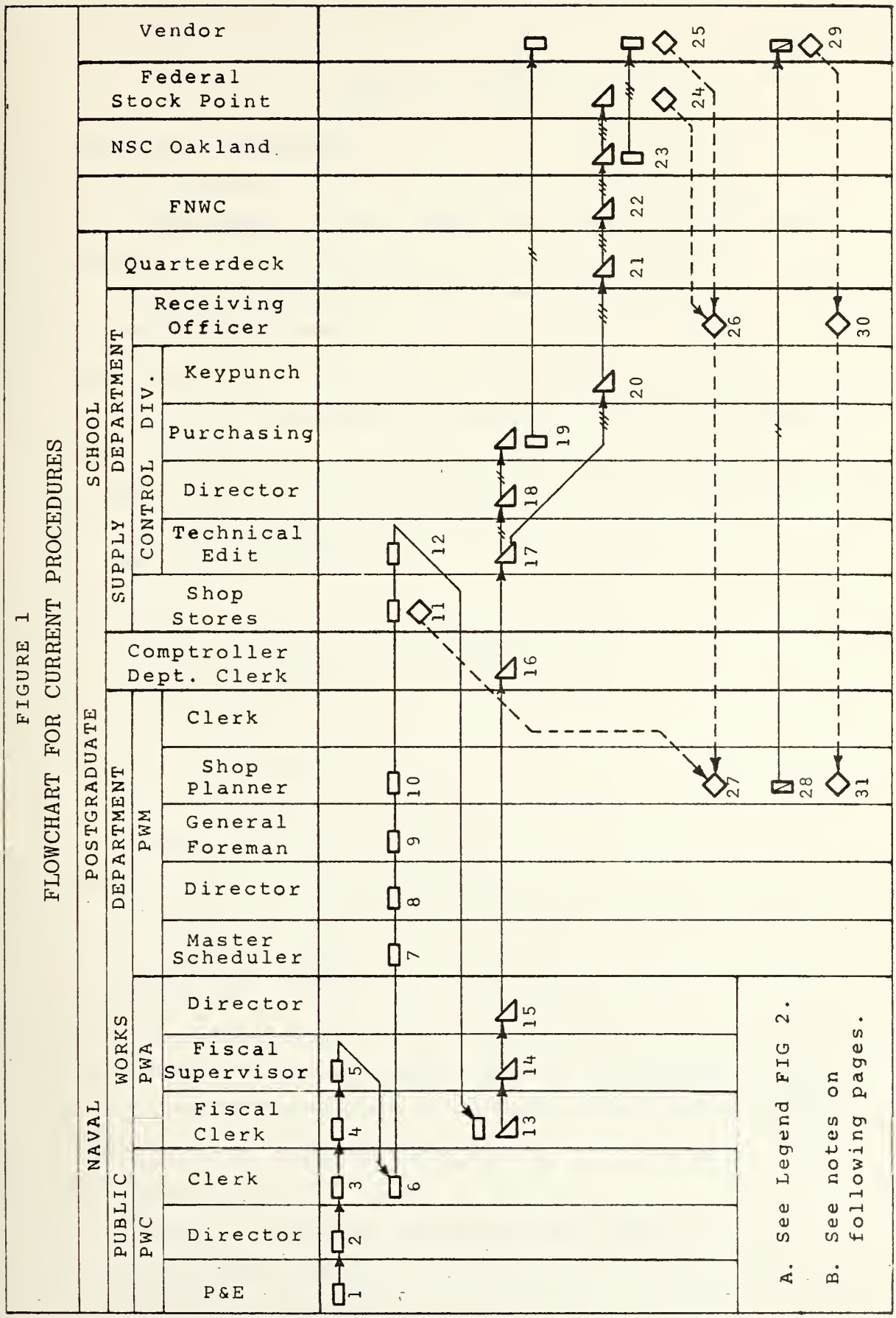
1. It is recommended that further analysis be made to determine if the amount of unplanned work accomplished by the PWD is excessive, as indicated in Fig. 8, and if so to determine the contributing reasons and the appropriate corrective measures. (See subparagraph IV B. 1. c. above.)

2. If STUB preparation remains in PWA, it is recommended that further analysis be made to determine if the STUB processing time in subtask 13 is excessive, as indicated in

Figs. 6 and 7, and if so to determine the appropriate corrective action. (See subparagraph IV B. 2. b. (2) (a) above.)

FIGURE 1

FLOWCHART FOR CURRENT PROCEDURES



NOTES TO FIGURE 1

1. PWC Planner and Estimator
   a. Initiates WA
   b. Prepares MLs. A separate ML sheet is made for each stream source for each WC.
   c. Copies the description from the WA on each ML.
   d. Handcarries forward.

2. PWC Director
   a. Reviews WA for soundness of design and estimate and necessity for the work.
   b. Approves WA. If WA is beyond PWCD approval authority, signature of appropriate officer is obtained.
   c. Handcarries forward.

3. PWC Clerk
   a. Assigns SCN and enters on WA and all ML's.
   b. Handcarries forward.

4. PWA Fiscal Clerk
   a. Date-time stamps WA.
   b. Determines proper accounting data and enters on WA.
   c. Ensures that OPTAR material balance is sufficient to allow approval of WA.
   d. Prepares input document to establish new JON for forwarding via comptroller to NSCO.
   e. Handcarries forward.

5. PWA Fiscal Supervisor
   a. Reviews and approves accounting data and JON input document.
   b. Returns to Fiscal clerk to handcarry forward and send input document.

6. PWC Clerk
   a. Enters WA information in PWC monitoring aids.
   b. Reproduces copies of WA and MLs for PWM, PWA, PWC files.
   c. Forwards via PW driver (4 runs daily).

7. PWM Master Scheduler
   a. Date-time stamps WA.
   b. Prepares JF and schedule board monitoring strips.
   c. Handcarries forward.

8. PWM Director
   a. Assigns GF.
   b. Handcarries forward.

9. PWM General Foreman
   a. Reviews WA/ML for errors. Visits jobsite if appropriate.
   b. Handcarries forward.

10. PWM Shop Planner
   a. Copies accounting data for WA on all ML's.
   b. Withdraws MLs for BPA procurement and holds in JF.
   c. Sends all remaining MLs to SSS via returning SSS employees.

11. Shop Stores
   a. Posts items carried as dropped from inventory.
   b. Pulls items on hand and stages for issue.
   c. Backorders SSS items not in stock.
   d. Marks up MLs to show items issued and backordered.
   e. Handcarries MLs for remaining items forward once daily.
   f. Delivers items on hand to SP with marked up ML.
   g. Prepares DIR showing items issued and backordered. These are forwarded to PWA each week for stub preparation.

12. Technical Edit
   a. Checks non FSN items for substitute FSN items.
   b. Checks FSN items to ensure correctness.
   c. Forwards via guardmail.

13. PWA Fiscal Clerk
   a. Date-time stamps ML.
   b. Checks JON on ML to ensure it agrees with description of work on ML.
   c. Determines proper accounting data and enters on ML.
   d. Prepares STUB and enters STUB numbers on MLs.
   e. Handcarries forward.

14. PWA Fiscal Supervisor

    a. Checks STUB and approves.

    b. Handcarries forward.

15. PWA Director

    a. Releases STUB.

    b. Returns it to clerk who reproduces copies of MLs with STUB numbers for PWA, PWM, PWC and forwards via guardmail (handcarries high priority STUBS).

16. Comptroller Budget Division Clerk

    a. Pulls green copy of STUB for posting.

    b. Handcarries forward.

17. Technical Editor

    a. Date-time stamps STUB and pulls file copies.

    b. Checks non-FSN items for substitute FSN items.

    c. Checks FSN items to ensure correctness. Necessary corrections are made and PWA is notified. Comproller is also notified of price changes.

    d. Handcarries forward.

18. Control Division Director

    a. Reviews non-FSN items.

    b. Handcarries forward.

19. Purchasing Branch

    a. Assigns buyer for non-FSN items.

    b. Prepares procurement documents for non-FSN items.

    c. Awards contract for non-FSN items. PWA and Comptroller are notified of price changes.

20. Keypunch Operator

    a. Prepares AUTODIN computer input card for each FSN STUB.

    b. Handcarries forward.

21. Quarter Deck

    Delivers STUB cards to FNWC three times daily.

22. Fleet Numerical Weather Central

    Transmits STUB cards to NSCO via AUTODIN.

23. NSC Oakland

Fills order, passes it to a Federal Stock Point or places it with a Vendor.

24. Federal Stock Point

Pulls item and ships it to NPS.

25. Vendor

Manufactures or acquires item and ships it to NPS.

26. Receiving Officer

a. Checks item received to ensure correctness.

b. Delivers item by truck.

27. PWM Shop Planner

a. Certifies receipt of item.

b. Stores item in segregated storage or issues to WC Supervisor.

WHEN ALL LONG LEAD ITEMS ARE ON HAND

28. PWM Shop Planner

a. Places orders for BPA items with local vendors.

b. Prepares BPA form for each order and gives it to PWM driver.

29. BPA Vendors

Releases BPA items to PWM driver with vendor's delivery papers.

30. Receiving Officer

a. Certifies item carried by PWM driver is correct.

b. Forwards copy of certified BPA form to Receipt Control Branch.

31. PWM Shop Planner

a. Stores item in Segregated Storage.

b. Marks up ML in JF to show item is on hand.

c. Notifies Master Scheduler when all material is on hand.

FIGURE 2

TYPICAL LEGEND FOR ALL FLOWCHARTS

Material Test

STUB

Procurement Document

BPA Form

Items Ordered

Flow - Various Stream Sources

Flow - SSS Items Only

Flow - Non FSN Items Only

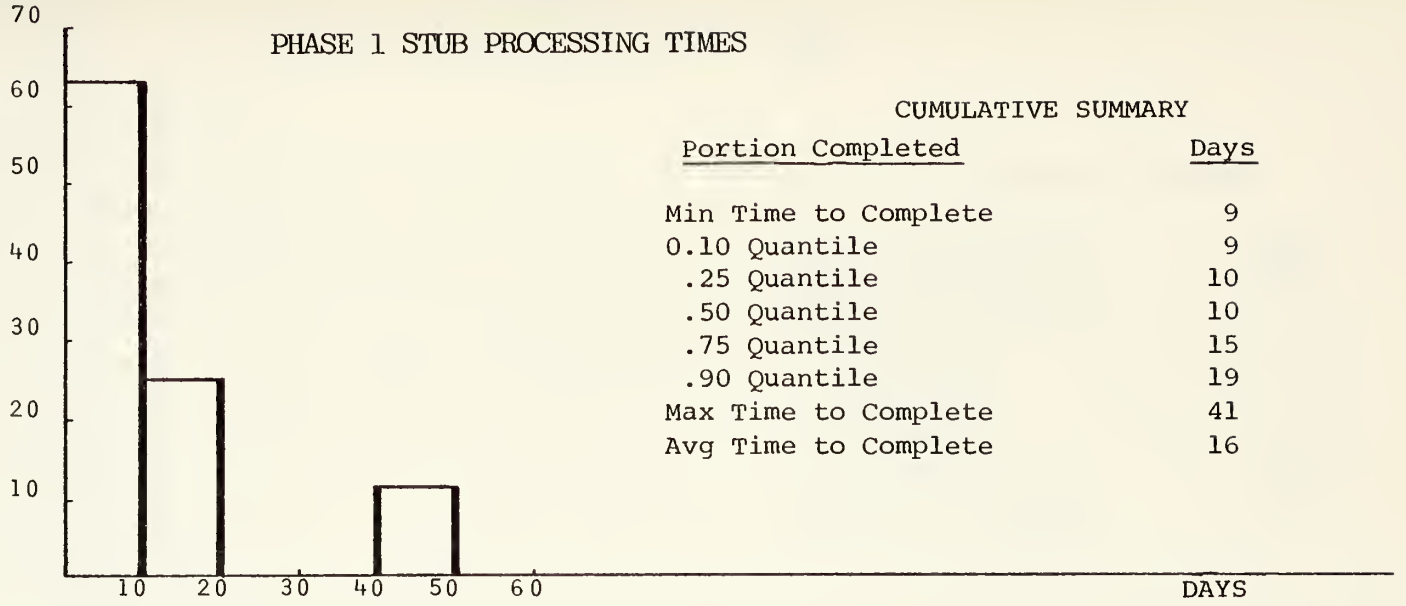
Flow - FSN Items Only

Flow - Items Ordered

FIGURE 3

PHASE 1 STUB PROCESSING TIMES

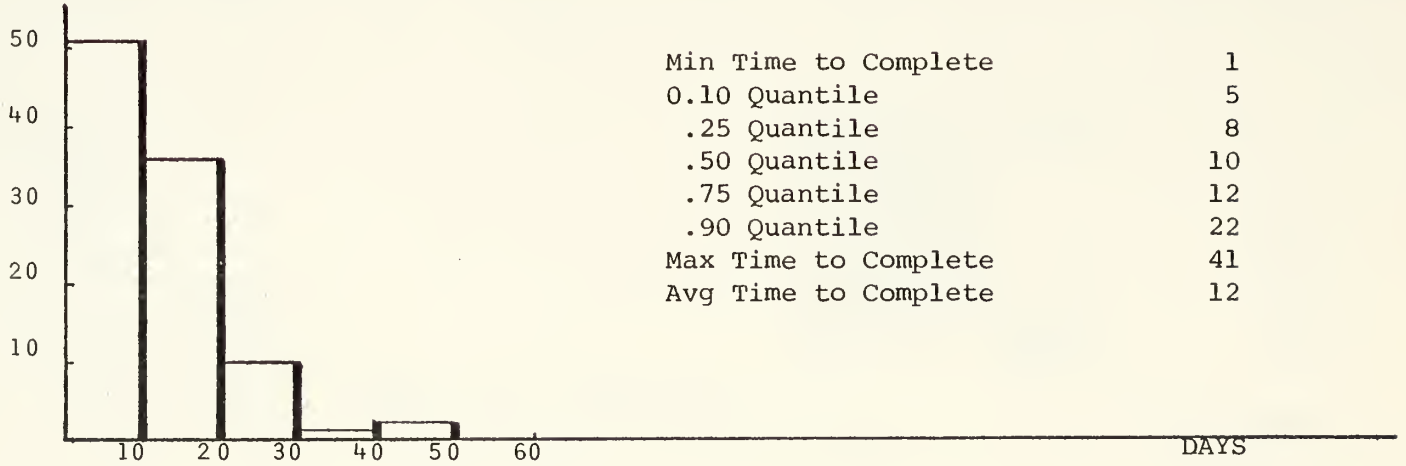
PERCENT COMPLETE



FSN

CUMULATIVE SUMMARY

Portion Completed	Days
Min Time to Complete	9
0.10 Quantile	9
.25 Quantile	10
.50 Quantile	10
.75 Quantile	15
.90 Quantile	19
Max Time to Complete	41
Avg Time to Complete	16



NON FSN

Min Time to Complete	1
0.10 Quantile	5
.25 Quantile	8
.50 Quantile	10
.75 Quantile	12
.90 Quantile	22
Max Time to Complete	41
Avg Time to Complete	12

FIGURE 4

PHASE 2 STUB PROCESSING TIMES

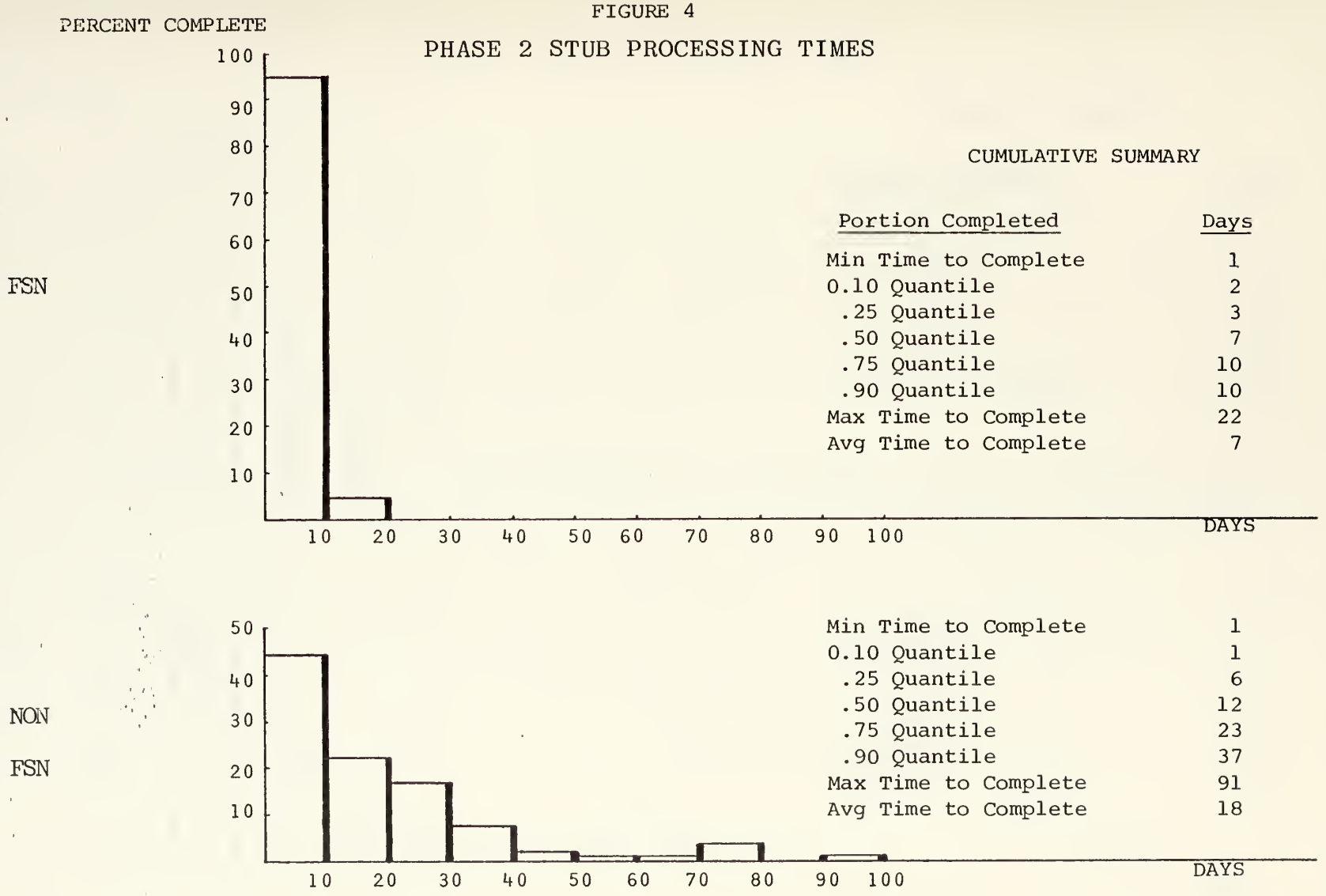
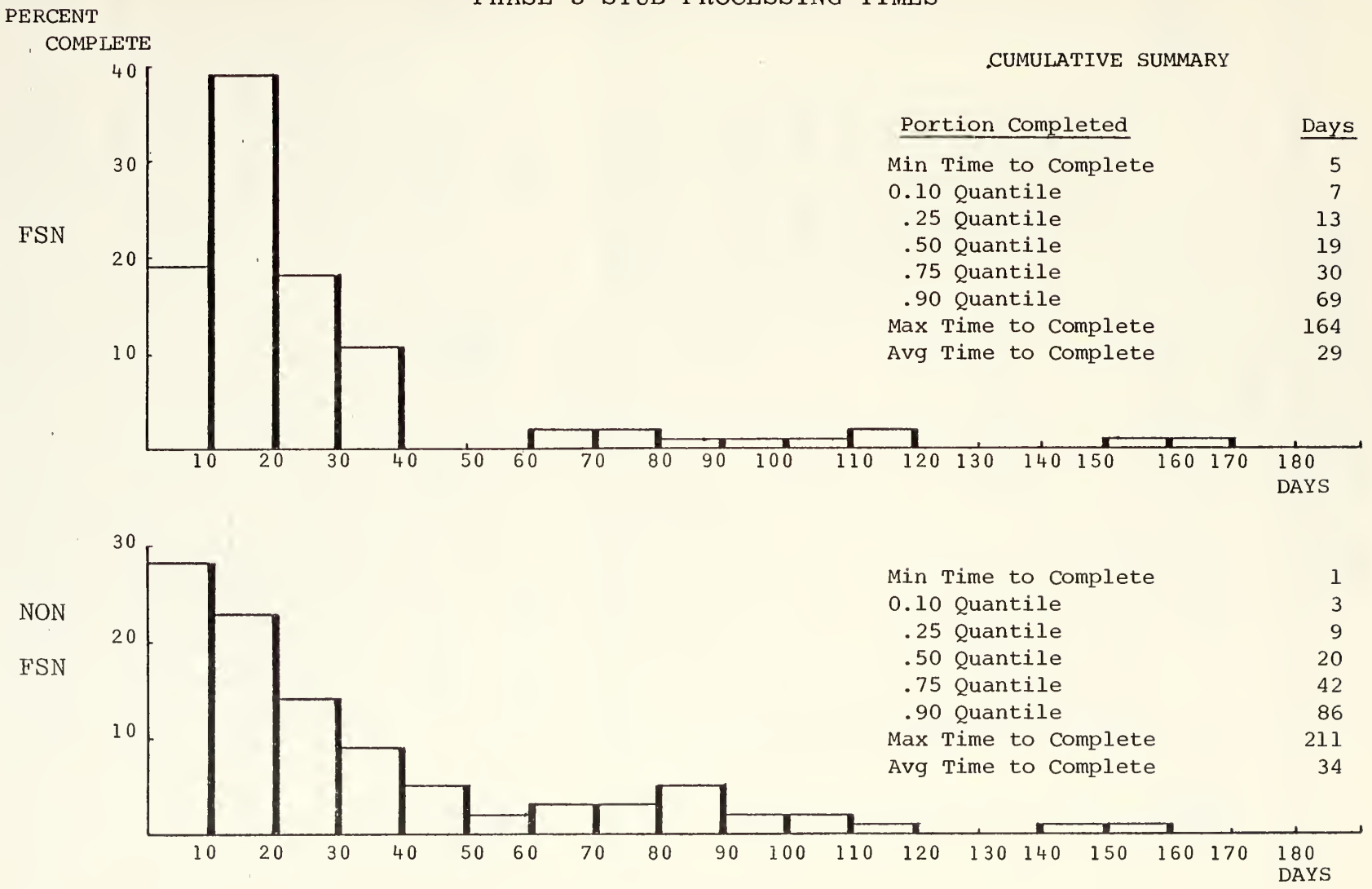


FIGURE 5

PHASE 3 STUB PROCESSING TIMES



CUMULATIVE SUMMARY

Portion Completed	Days
Min Time to Complete	5
0.10 Quantile	7
.25 Quantile	13
.50 Quantile	19
.75 Quantile	30
.90 Quantile	69
Max Time to Complete	164
Avg Time to Complete	29

Min Time to Complete	1
0.10 Quantile	3
.25 Quantile	9
.50 Quantile	20
.75 Quantile	42
.90 Quantile	86
Max Time to Complete	211
Avg Time to Complete	34

FIGURE 6

SUBTASK COMPLETION TIMES

Route Slip Measurements

PHASE I

SUBTASK NUMBER *	POSITION	AVG COMP TIME DAYS
3	PWC Clerk	0.3
4	PWA Fiscal Clerk	.4
5	PWA Fiscal Branch Supervisor	.3
6	PWC Clerk	.4
7	PWM Master Scheduler	.6
8	PWM Director	.4
10	PWM Shop Planner	.7
11	Shop Stores	1.0
12	Technical Editor	1.3
13	PWA Accounting Clerk	2.3
Total of Average Times		7.7

PHASE II

FSN			NON FSN		
Sub-task No.*	POSITION	Avg Comp Time Days	Sub-task No.*	POSITION	Avg Comp Time Days
13	PWA Fiscal Clerk	0.4	13	PWA Fiscal Clerk	0.4
14	PWA Fiscal Super.	.4	14	PWA Fiscal Super.	.4
15	PWA Director	.5	15	PWA Director	.5
16	Comptroller Clerk	.6	16	Comptroller Clerk	.6
17	Technical Editor	.3	17	Technical Editor	.3
20	Key Punch Operator	.5	18	Control Div Director	.3
			19	Purchasing Branch	4.5
Total of Average Times		2.7	Total of Average Times		7.0

* From Figure 1

FIGURE 7

SUBTASK CIRCULATION TIMES
Dummy Route Slip Measurement

SUBTASK	POSITION	AVERAGE CIRCULATION TIME (Days)
3	PWC Clerk	.3
4	PWA Fiscal Clerk	.2
6	PWC Clerk	.2
7	PWM Master Scheduler	.2
10	PWM Shop Planner	.2
11	Shop Stores	.3
12	Technical Edit	.9
13	PWA Fiscal Clerk	1.2

FIGURE 8

PWD MATERIAL STUBS RELEASED 2nd QTR FY 77

For Specific WAs

STUB VALUE	FSN		NON FSN		TOTALS	
	SSS	NSCO	INT. BPA	OTHER	AMT	%
0 - 9.99	44	8	28	8	88	18%
10 - 49.99	44	10	83	29	166	35%
50 - 99.99	20	8	34	25	87	18%
100 - 499.99	12	7	55	48	122	25%
500 - 999.99		1		10	11	2%
1000 +		2		8	10	2%
Total	120	36	200	128	484	100%
%	25%	7%	41%	27%	100%	36%

For Other Than Specific WAs (Facilities)

0 - 9.99	44	12	89	13	158	23%
10 - 49.99	34	20	177	31	262	37%
50 - 99.99	10	6	42	35	93	13%
100 - 499.99	14	16	54	65	149	21%
500 - 999.99	12	1		10	23	3%
1000 +	3	2		16	21	3%
Total	117	57	362	170	706	100%
%	17%	8%	51%	24%	100%	53%

For Transportation

0 - 9.99	9	3	27	10	49	34%
10 - 49.99	5	1	43	7	56	38%
50 - 99.99	4		16	3	23	16%
100 - 499.99	2		4	6	12	8%
500 - 999.99				3	3	2%
1000 +				3	3	2%
Total	20	4	90	32	146	100%
%	14%	2%	62%	22%	100%	11%

Totals

0 - 9.99	97	23	144	31	295	22%
10 - 49.99	83	31	303	67	484	36%
50 - 99.99	34	14	92	63	203	15%
100 - 499.99	28	23	113	119	283	21%
500 - 999.99	12	2		23	37	3%
1000 +	3	4		27	34	3%
Total	257	97	652	330	1,336	100%
%	19%	7%	49%	25%	100%	100%

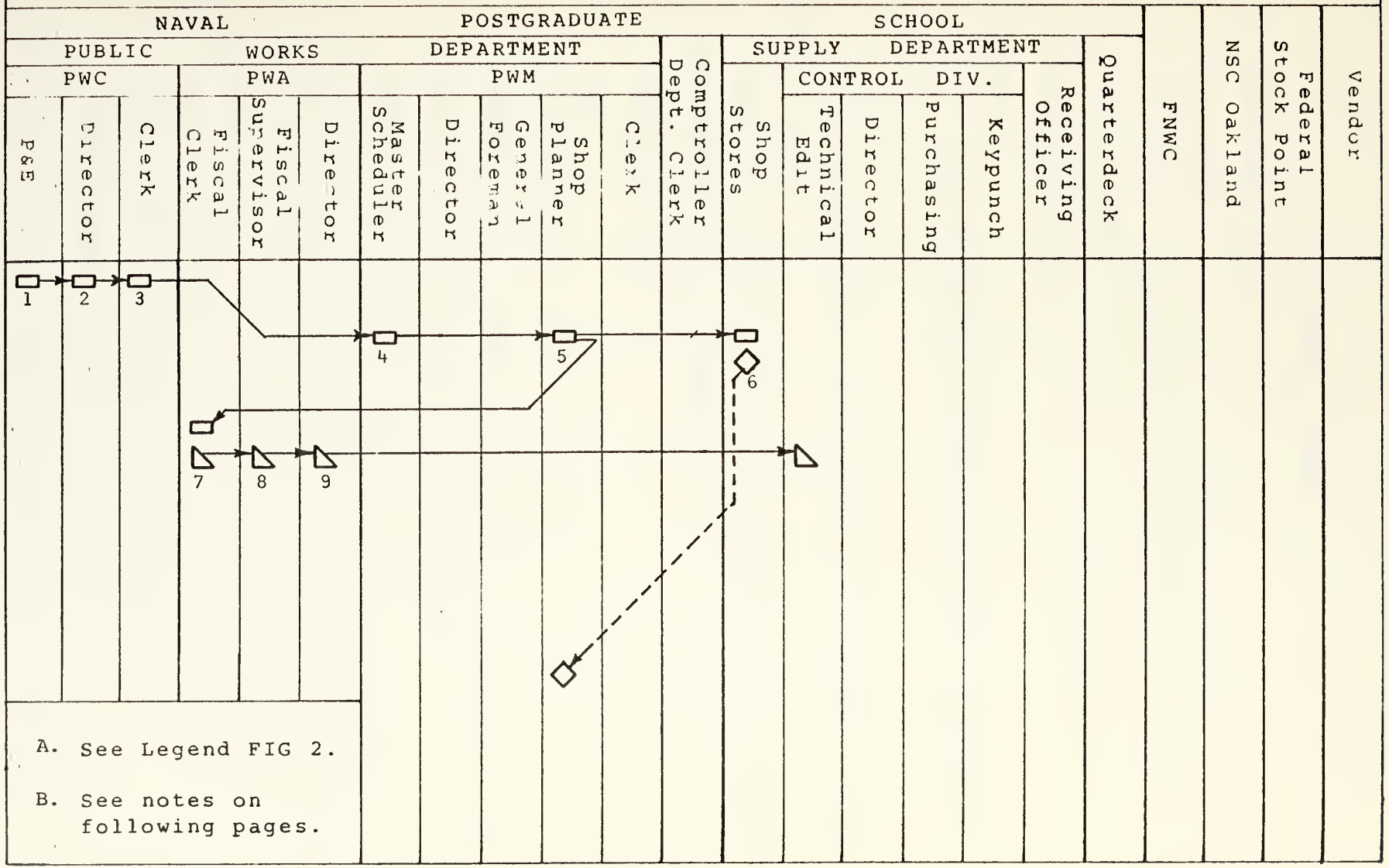
FIGURE 9

WAs RELEASED DURING FY 1977

SOURCE OF FUNDS	TYPE OF WA		
	Standing	Specific	Total
NPS	48	290	338
NPS Annex	15	24	49
Housing			
Public Quarters	37	36	73
Wherry	29	36	65
Quarters B-N	9	10	19
Quarters A	3	1	4
Other Reimbursible	8	89	97
Total	149	486	635

FIGURE 10

FLOWCHART FOR ALTERNATIVE 1



A. See Legend FIG 2.

B. See notes on following pages.

NOTES TO FIGURE 10

1. PWC Planner and Estimator

   a. Initiates WA

   b. Prepares MLs. A separate ML sheet is made for each stream source for each WC.

   c. Handcarries forward.

2. PWC Director

   a. Reviews WA for soundness of design and estimate and necessity for the work.

   b. Checks to ensure OPTAR material balance is sufficient to allow approval of WA.

   c. Approves WA. If WA is beyond PWCD approval authority, signature of appropriate officer is obtained.

   d. Handcarries forward.

3. PWC Clerk

   a. Assigns SCN and enters on WA and all MLs.

   b. Determines proper accounting data and enters on WA and all MLs.

   c. Enters data from WA on all PWC monitoring aids.

   d. Forwards via PW driver (4 runs daily).

   e. Forwards copy of WA to PWA for preparation of input document to establish new JON.

4. PWM Master Scheduler

   a. Date-time stamps WA.

   b. Prepares JF and schedule board monitoring strips.

   c. Handcarries forward.

d. Hands copy of WA to PWMD for review and subsequent routing to PWM GF for his review and to SP for retention on the JF.

5. PWM Shop Planner

a. Withdraws MLs for BPA procurement and holds in JF.

b. Withdraws MLs for long lead items and forwards with copy of WA to PWA for STUB preparation via PW driver.

c. Sends remaining MLs to SSS via returning SSS employees.

6. Shop Stores

a. Posts items carried as dropped from inventory.

b. Pulls items on hand and stages for issue.

c. Backorders SSS items not in stock.

d. Marks up MLs to show items issued and backordered.

e. Delivers items on hand to the SP with marked up ML.

f. Prepares DIR showing items issued/backordered and forwards to PWA for STUB preparation.

7. PWA Fiscal Clerk

a. Date-stamps WA/ML.

b. Prepares STUBS and enters STUB numbers on MLs.

c. Releases STUBS.

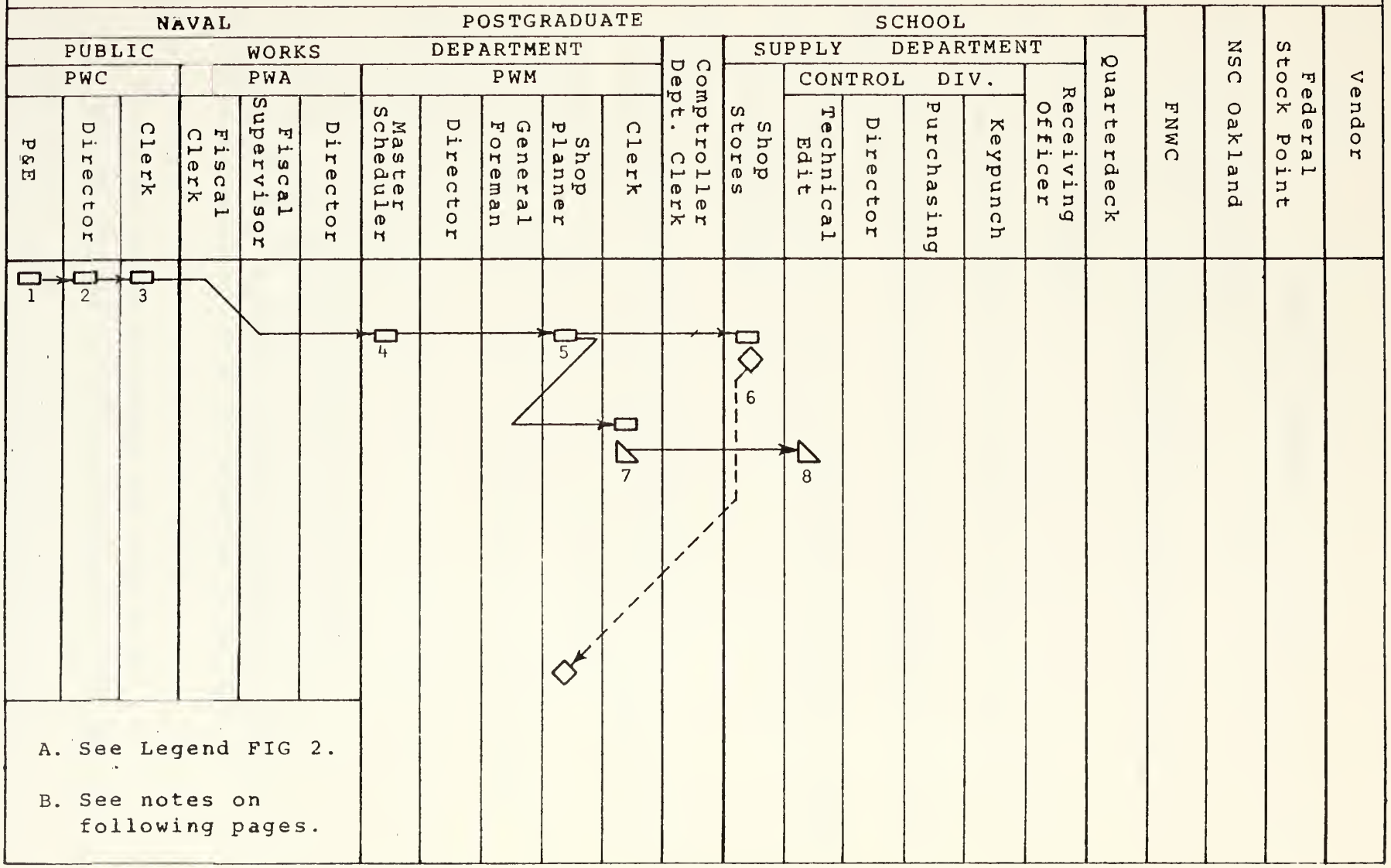
d. Forwards STUBS to Supply Department via Comptroller.

e. Forwards ML marked up with STUB numbers to PWM.

8. Remainder of Flow Process is identical to Figure 13, subtasks 9 through 22.

FIGURE 11

FLOWCHART FOR ALTERNATIVE 2



A. See Legend FIG 2.

B. See notes on following pages.

NOTES TO FIGURE 11

1. PWC Planner and Estimator
   a. Initiates WA
   b. Prepares MLs. A separate ML sheet is made for each stream source for each WC.
   c. Handcarries forward.

2. PWC Director
   a. Reviews WA for soundness of design and estimate and necessity for the work.
   b. Checks to ensure OPTAR material balance is sufficient to allow approval of WA.
   c. Approves WA. If WA is beyond PWCD approval authority, signature of appropriate officer is obtained.
   d. Handcarries forward.

3. PWC Clerk
   a. Assigns SCN and enters on WA and all MLs.
   b. Determines proper accounting data and enters on WA and all MLs.
   c. Enters data from WA on all PWC monitoring aids.
   d. Forwards via PW driver (4 runs daily).
   e. Forwards copy of WA to PWA for preparation of input document to establish new JON.

4. PWM Master Scheduler
   a. Date-time stamps WA.
   b. Prepares JF and schedule board monitoring strips.
   c. Handcarries forward.
   d. Hands copy of WA to PWMD for review and subsequent routing to PWM GF for his review and to SP for retention in the JF.

5. PWM Shop Planner
   a. Withdraws MLs for BPA procurement and holds in JF.
   b. Withdraws MLs for long leads items and hands to PWM clerk for STUB preparation.
   c. Sends remaining MLs to SSS via returning SSS employees.

6. Shop Stores

   a. Posts items carried as dropped from inventory.

   b. Pulls items on hand and stamps for issue.

   c. Backorders SSS items not in stock.

   d. Marks up MLs to show items issued and backordered.

   e. Delivers items on hand to SP with marked ML.

   f. Prepares DIR showing items issued/backordered and forwards to PWM for STUB preparation.

7. PWM Clerk

   a. Prepares STUBs and enters STUB numbers on MLs.

   b. Releases STUBs.

   c. Forwards STUBs to comptroller via PW driver (4 runs daily).

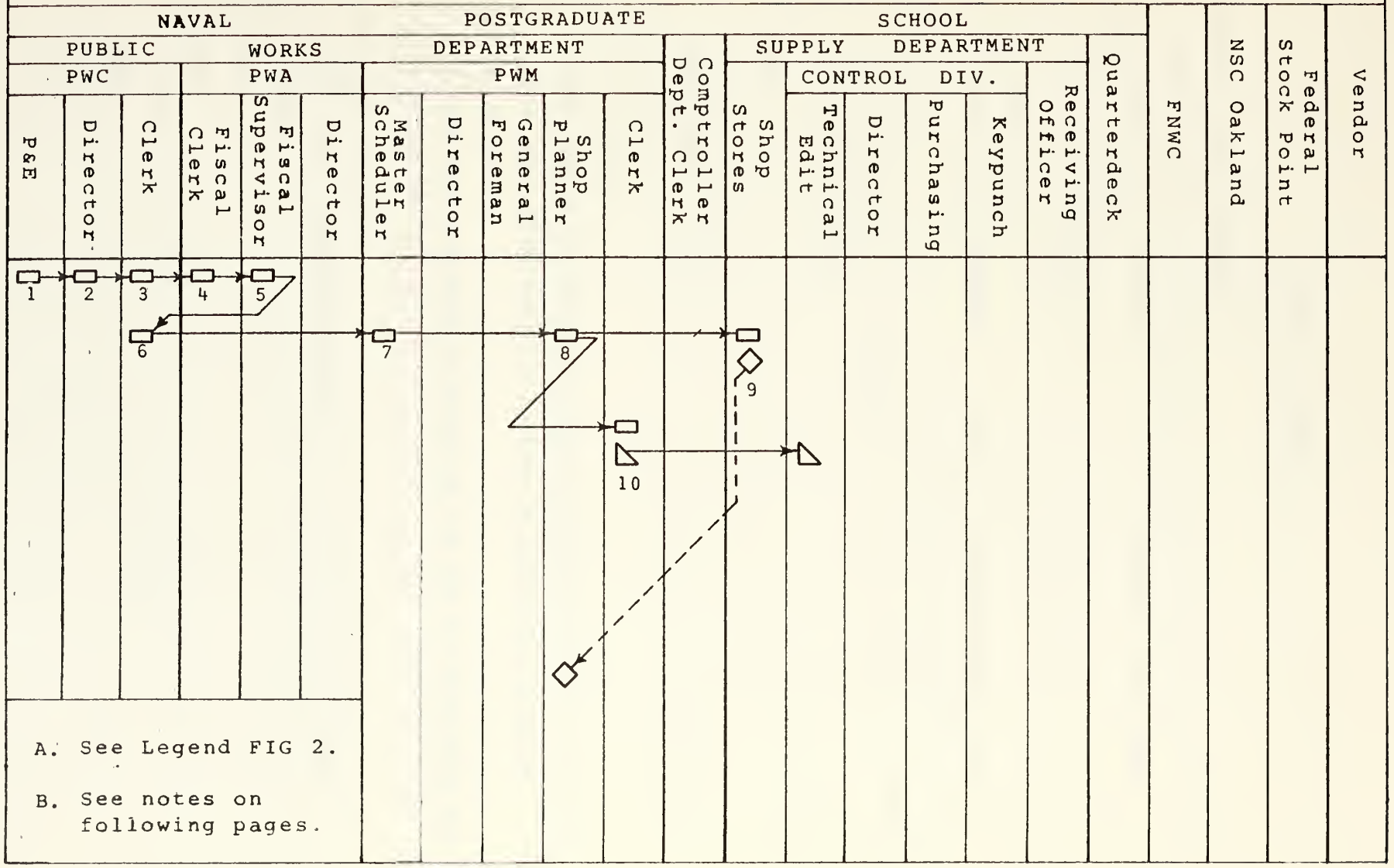
   d. Files ML marked up with STUB numbers in JF.

   e. Forwards copy of STUBs to PWA for posting.

8. Remainder of Flow Process is identical to Figure 13 subtasks 9 through 22.

FIGURE 12

FLOWCHART FOR ALTERNATIVE 3



A. See Legend FIG 2.

B. See notes on following pages.

NOTES TO FIGURE 12

1. PWC Planner and Estimator.
   a. Initiates WA.
   b. Prepares MLs. A separate ML sheet is made for each stream source for each WC.
   c. Handcarries forward.
2. PWC Director
   a. Reviews WA for soundness of design and estimate and necessity for the work.
   b. Approves WA. If WA is beyond PWCD approval authority, signature of appropriate officer is obtained.
   c. Handcarries forward.
3. PWC Clerk
   a. Assigns SCN and enters on WA and MLs.
   b. Handcarries forward.
4. PWA Fiscal Clerk
   a. Date-time stamps WA.
   b. Determines proper accounting data and enters on WA.
   c. Ensures that OPTAR material balance is sufficient to allow approval of WA.
   d. Prepares input document to establish new JON for forwarding via Comptroller to NSCO.
5. PWA Fiscal Supervisor
   a. Reviews and approves accounting data and JON input document.
   b. Returns to Fiscal Clerk to handcarry forward and send input document.
6. PWC Clerk
   a. Enters WA information in PWC monitoring aids.
   b. Reproduces copies of WA and MLs for PWM, PWA, PWC files.
   c. Forwards via PW driver (4 runs daily).

7. PWM Master Scheduler

   a. Date-time stamps WA.

   b. Prepares JF and schedule board monitoring strips.

   c. Handcarries forward.

   d. Hands copy of WA to PWMD for review and subsequent routing to PWM GF for his review and to SP for retention in the JF.

8. PWM Shop Planner

   a. Withdraws MLs for BPA procurement and holds in JF.

   b. Withdraws MLs for long lead items and hands to PWM clerk for STUB preparation.

   c. Sends remaining MLs to SSS via returning SSS employees.

9. Shop Stores

   a. Posts items carried as dropped from inventory.

   b. Pulls items on hand and stages for issue.

   c. Backorders SSS items not in stock.

   d. Marks up MLs to show items issued and backordered.

   e. Delivers items on hand to SP with marked up ML.

   f. Prepares DIR showing items issued/backordered and forwards to PWM for STUB preparation.

10. PWM Clerk

   a. Prepares STUBs and enters STUB members on MLs.

   b. Releases STUBs.

   c. Forwards STUBs to Comptroller via PW driver (4 runs daily).

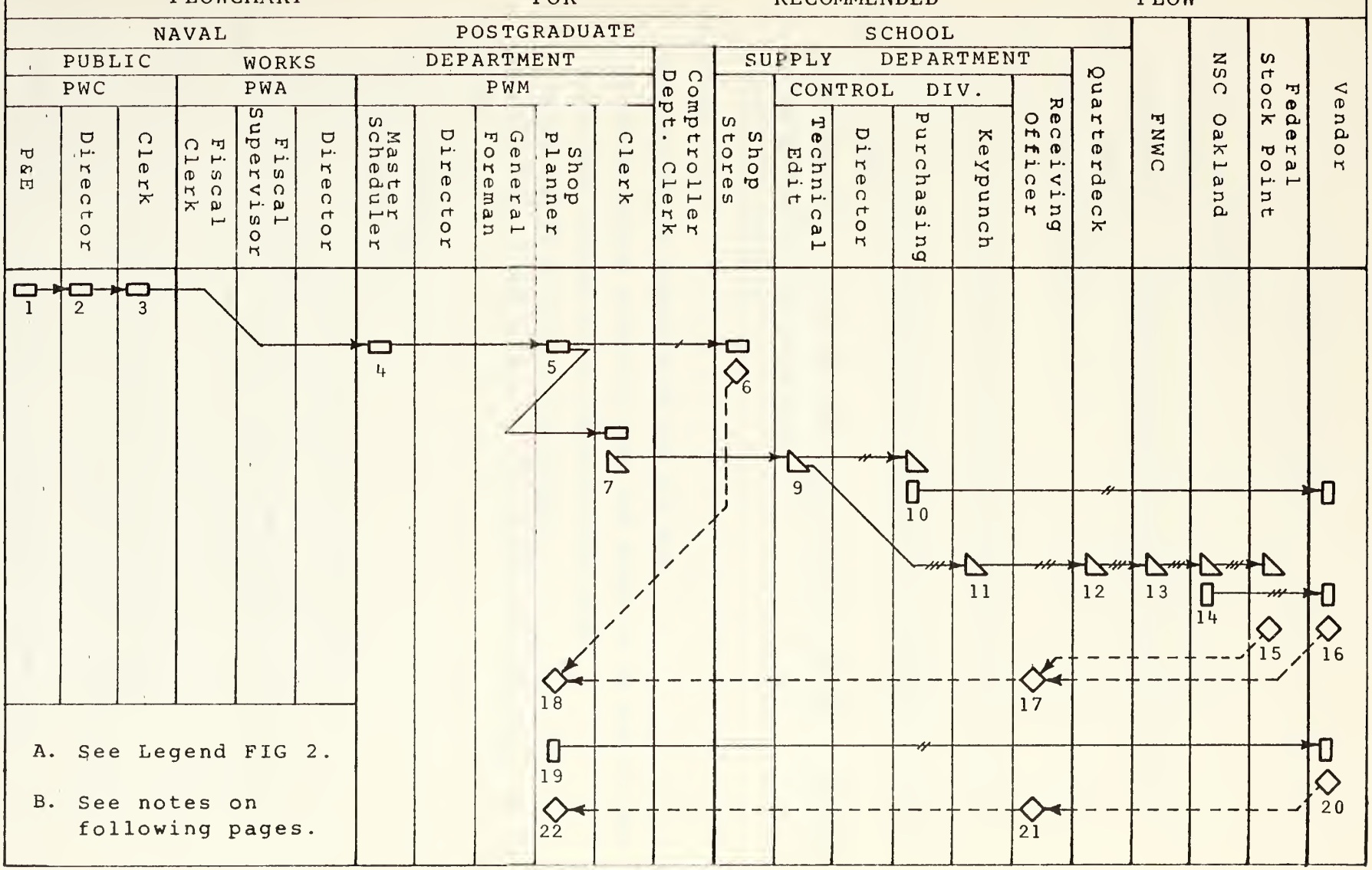
   d. Files ML marked up with STUB numbers in JF.

   e. Forwards copy of STUBs to PWA for posting.

11. Remainder of Flow Process is identical to Figure 13 subtasks 9 through 22.

FIGURE 13

FLOWCHART FOR RECOMMENDED FLOW



A. See Legend FIG 2.

B. See notes on following pages.

NOTES TO FIGURE 13

1. PWC Planner and Estimator
   a. Initiates WA.
   b. Prepares MLs. A separate ML sheet is made for each stream source for each WC.
   c. Handcarries forward.
2. PWC Director
   a. Reviews WA for soundness of design and estimate and necessity for the work.
   b. Checks to ensure OPTAR material balance is sufficient to allow approval of WA.
   c. Approves WA. If WA is beyond PWCD approval authority, signature of appropriate officer is obtained.
   d. Handcarries forward.
3. PWC Clerk
   a. Assigns SCN and enters on WA and all MLs.
   b. Determines proper accounting data and enters on WA and all MLs.
   c. Enters data from WA on all PWC monitoring aids.
   d. Forwards via PW driver (4 runs daily).
   e. Forwards copy of WA to PWA for preparation of input document to establish new JON.
4. PWM Master Scheduler
   a. Date-time stamps WA.
   b. Prepares JF and schedule board monitoring strips.
   c. Handcarries forward.
   d. Hands copy of WA to PWMD for review and subsequent routing to PWM GF for his review and to SP for retention in the JF.
5. PWM Shop Planner
   a. Withdraws MLs for BPA procurement and holds in JF.
   b. Withdraws MLs for long leads items and hands to PWM clerk for STUB preparation.
   c. Sends remaining MLs to SSS via returning SSS employees.

6. Shop Stores

   a. Posts items carried as dropped from inventory.

   b. Pulls items on hand and stages for issue.

   c. Backorders SSS items not in stock.

   d. Marks up MLs to show items issued and backordered.

   e. Delivers items on hand to SP with marked up ML.

   f. Prepares DIR showing items issued/backordered and forwards to PWM for STUB preparation.

7. PWM Clerk

   a. Prepares STUBs and enters STUB numbers on MLs.

   b. Releases STUBs.

   c. Forwards STUBs to Comptroller via PW driver (4 runs daily).

   d. Files marked up ML in JF.

   e. Forwards copy of STUBs to PWA for posting.

8. Budget Division Clerk

   a. Pulls green copy of STUB for posting.

   b. Handcarries forward.

9. Supply Department Technical Editor

   a. Date-time stamps STUB and pulls file copies.

   b. Checks non FSN items for substitute FSN items.

   c. Checks FSN items to ensure correctness. Necessary corrections are made and PWA is notified. Comptroller is also notified of price changes.

   d. Handcarries forward.

10. Purchasing Branch

   a. Assigns buyer.

   b. Prepares procurement documents for non FSN items.

   c. Awards contracts for non FSN items. PWA and Comptroller are notified of price changes.

11. Keypunch Operator

   a. Prepares Autodin computer input card for each FSN STUB.

   b. Handcarries forward.

12. Quarterdeck

   Delivers STUB cards to FNWC three times daily.

13. Fleet Numerical Weather Central

Transmits STUB cards to NSCO via Autodin.

14. NSC Oakland

Fills order or passes it to a Federal Stock Point or places it with a vendor.

15. Federal Stock Point

Pulls item and ships it to NPS.

16. Vendor

Manufacturers or acquires item and ships it to NPS.

17. Receiving Officer

a. Checks item received to ensure correctness.

b. Delivers them by truck.

18. PWM Shop Planner

a. Certifies receipt of item.

b. Stores item in Segregated Storage.

c. Marks up ML in JF to show location of item in Segregated Storage.

WHEN ALL LONG LEAD ITEMS ARE ON HAND

19. PWM Shop Planner

a. Places orders for BPA items with local vendors.

b. Prepares BPA form for each order and gives to PWM driver.

20. BPA Vendors

Releases BPA items to PWM driver with Vendors delivery papers.

21. Receiving Officer

a. Certifies item carried by PWM driver is the item ordered on the BPA form.

b. Forwards copy of certified BPA form to Receipt Control Branch.

22. PWM Shop Planner

a. Stores items in Segregated Storage.

b. Marks up ML in JF to show location of item in Segregated Storage.

c. Notifies Master Scheduler when all material is on hand.

LIST OF REFERENCES

1. Department of the Navy, Naval Facilities Engineering Command Manual NAVFAC MO 321, Maintenance Management of Public Works and Public Utilities, November 1975.

2. Moskowitz, S., Director, Maintenance Control Division, Public Works Department, Naval Postgraduate School, Monterey, California, Interview, 1977.

3. Department of the Navy NAVSO P1000, Navy Comptroller Manual, Volume II, 4 February 1952.

4. Joyce, J. L., Director, Maintenance Division, Public Works Department, Naval Postgraduate School, Monterey, California, Interview, 1977.

5. Department of Defense, Armed Services Procurement Regulations, Section III, Part 6, 1 July 1976.

6. Malone, M. R., Warehouse Foreman, Ready Supply Stores Branch and Receiving and Traffic Branch, Material Division, Supply Department, Naval Postgraduate School, Monterey, California, Interview, 1977.

7. Meadows, L. L., Supervisory Budget Analyst, Budget Division, Comptroller Department, Naval Postgraduate School, Monterey, California, Interview, 1977.

8. Strickland, S. D., Supervisor, Purchasing Branch, Control Division, Supply Department, Naval Postgraduate School, Monterey, California, Interview, 1977.

9. Melton, J. L., Clerk, Maintenance Control Division, Public Works Department, Naval Postgraduate School, Monterey, California, Interview, 1977.

10. Bennett, E. L., Supervisor, Fiscal Branch, Administrative Division, Public Works Department, Naval Postgraduate School, Monterey, California, Interview, 1977.

11. Trujillo, P. A., Director, Administrative Division, Public Works Department, Naval Postgraduate School, Monterey, California, Interview, 1977.

12. Umu, F., Storekeeper First Class, U. S. Navy, Supervisor, Issue Control Branch, Supply Department, Naval Postgraduate School, Monterey, California, Interview, 1977.

13. White, N. A., Shop Planner, Maintenance Division, Public Works Department, Naval Postgraduate School, Monterey, California, Interview, 1977.

14. Naval Postgraduate School Instruction 4235.1F, Preparation of Military Standard Requisitions and Issue Procedure (MILSTRIP) Requisitions; instructions for, 18 September 1968.

15. Hydar, W. H., Assistant to the Director, Facilities Management Department, Atlantic Division, Naval Facilities Engineering Command, Norfolk, Virginia, Interview, 1977.

16. Schmidt, J. P., Supervisor, Receipt Control Branch, Control Division, Supply Department, Naval Postgraduate School, Monterey, California, Interview, 1977.

17. Department of the Navy, Naval Supply Systems Command NAVSUP P 485, Afloat Supply Procedures, 24 September 1974.

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